9.0 <u>CLOSURE PLAN / FINANCIAL ASSURANCE FOR CLOSURE</u>

[WAC 173-303-806(4)(A)(XII), 610(2) - (6)]

This chapter describes the performance standards and closure activities associated with closure of AREVA's Dangerous Waste Storage Facility (DWSF) and Component Chemical Waste Tank (CCWT). Both storage units will be closed in accordance with WAC 173-303-610 and in consideration of Ecology's Guidance for Clean Closure of Dangerous Waste Units and Facilities, Publication #94-111.

AREVA's Closure Plan for the DWSF, E06-04-005, is included as Attachment 9-1. The Closure Plan for the CCWT, E06-04-009, is included as Attachment 9-2.

Attachment 9-1. Closure Plan for the Dangerous Waste Storage Facility (E06-04-005).

EHS&L Document

Closure Plan for the Dangerous Waste Storage Facility

Nature of Changes

Item	Paragraph	Description	Justification
1.	Entire document	Convert from "interim status" closure plan to "final status" closure plan with updated information on: ➢ Regulatory basis ➢ Facility description ➢ Inventory description ➢ Inventory disposition pathways ➢ Closure costs	Required to support Part B permit application for final status under Ecology's Dangerous Waste Regulations
2.			
3.			
4.			

List Below any Documents, including Forms & Operator Aids which must be issued concurrently with this document revision:		

This Document contains a total of 31 pages excluding the signature page generated by Documentum, the document control application software.

DOCUMENT REVIEW/APPROVAL/DELETION CHECKLIST

All new and/or revised procedures shall be approved by the change author, cognizant manager(s) of areas affected by the changes, and by applicable manager(s) of any function that approved the previous revision of the document unless responsibility for such approval has been transferred to another organization. Also, the procedure shall be approved by manager(s) of functional organizations that provide technical reviews with the exception of the Training Department. Finally, Document Control shall verify that the required approvals have been properly obtained and that any documents that must be issued concurrently are ready to be issued.

Minor Changes: If the proposed changes are limited to editorial and/or administrative changes check the box at the right. The document will be routed directly for review by EHS&L without technical review. All applicable approvals must still be obtained.	☐

Document Reviews			**Document Approvals**	
Purpose/Function of Review	Specify Reviewer(s) (Optional except for change author)	(Check all that apply)	Title of Approver	(Check all that Apply)
Document Control (Automatic)		☒	Document Control (Automatic)	☒
Change Author	LJ Maas	☒	Author	☒
Independent Technical Review	JB Perryman	☒		
Operability Review(s)			Mgr, Richland Operations[1]	☐
Conversion		☐	Mgr, Uranium Conversion & Recovery Operations[1]	☒
Recovery	WA Koglin	☒		
Ceramics		☐	Mgr, Ceramic Operations[1]	☐
Rods		☐	Mgr, Rods & Bundles[1]	☐
Bundles		☐		
Transportation		☐		
Components		☐	Mgr, Component Fabrication[1]	☐
Maintenance Review		☐	Mgr, Maintenance[1]	☐
Lab Review		☐	Mgr, Analytical Services[1]	☐
EHS&L Review(s)			Mgr, EHS&L[2]	☐
Criticality		☐	Mgr, Criticality Safety[2]	☐
Radiation Protection		☐	Mgr, Safety, Security & Emergency Preparedness[2]	☐
Safety/Security		☐		
Emergency Preparedness		☐		
MC&A		☐	Mgr, Licensing & Compliance[2]	☒
Transportation		☐		
Environmental	JB Perryman	☒		
BWR Product Eng. Review		☐	Mgr, BWR Product Engineering	☐
BWR Core Engineering Review		☐	Mgr, BWR Core Engineering	☐
Codes and Methods Review		☐	Mgr, Codes and Methods	☐
Proj. Eng. & Design Support Review		☐	Mgr, Proj. Eng. & Design Support	☐
Quality Review		☐	Mgr, Quality	☐
Ops. Projects & Planning Review		☐	Mgr, Ops. Projects & Planning	☐
Others:		☐	Mgr, Richland Site/Other	☐
Training & Employee Dev.:[3]		☐	Training & Employee Dev.	☐

[1]Note: If approvals include 2 or more product center managers, the Operations manager can be substituted for the applicable product center managers.

[2]Note: If approvals include 2 or more EHS&L functional managers, the EHS&L manager can be substituted for the applicable EHS&L functional managers.

[3]Note: Training department review is required for all procedures that require or affect a Learning Plan and if additional training materials or curriculum must be revised before issuing procedure.

EHS&L Change Impact Evaluation Form		
Document / ECN No*.: E06-04-005		Change Evaluator: LJ Maas
Does the change potentially impact Criticality Alarm System (CAS) coverage?	☐ Yes ☒ No	If yes, explain:
NRC Pre-Approval Evaluation:		
Is NRC Pre-approval (License Amendment) Needed? (Based on "Yes" answer to any of five questions below). (Based on "No" answer to all five questions below).	☐ Yes ☒ No	
1. Does the change create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements of 10 CFR 70.61 (create high or intermediate consequence events) and that have not previously been described in AREVA NP Inc's ISA Summary?	☐ Yes ☒ No	If yes, explain:
2. Does the change use new processes, technologies, or control systems for which AREVA NP Inc. has no prior experience?	☐ Yes ☒ No	If yes, explain:
3. Does the change remove, without at least an equivalent replacement of the safety function, an item relied on for safety that is listed in the ISA Summary?	☐ Yes ☒ No	If yes, explain:
4. Does the change alter any item relied on for safety, listed in the ISA Summary, that is the sole item preventing or mitigating an accident sequence of high or intermediate consequences?	☐ Yes ☒ No	If yes, explain:
5. Does the change qualify as a change specifically prohibited by NRC regulation, order or license condition?	☐ Yes ☒ No	If yes, explain:
Actions Required Prior to or Concurrent with Change Implementation Evaluation:		
Action		**Explanation**
6. Modification / Addition to CAS system or system coverage documentation	☐ Yes ☒ No	If yes, explain:
7. Acquire NRC pre-approval (license amendment)	☐ Yes ☒ No	If yes, explain:
8. Conduct/modify ISA	☐ Yes ☒ No	If yes, explain:
9. ISA Database Modification	☐ Yes ☒ No	If yes, explain:
10. Modification of other safety program information / underlying analyses (PHA, RHA, FHA, NCSA, etc.)	☐ Yes ☒ No	If yes, explain:
Actions required subsequent to Change Implementation Evaluation:		
11. Update safety program information (PHA,RHA,FHA,NCSA, P&ID)	☐ Yes ☒ No	If yes, explain:

* **If this form exists as a part of a document, the document number is not required.**

1.0 Introduction

This Closure Plan applies to the Dangerous Waste Storage Facility (DWSF) at the AREVA NP Inc. (AREVA) nuclear fuel fabrication facility in Richland, WA. The DWSF has been operated to-date under interim status facility standards but is now the subject of a Part B permit application for final facility status. This updated closure plan, along with the most recent closure cost estimate for the facility, is being submitted in conjunction with that application in accordance with WAC 173-303-806 (xiii) and (xv).

Construction of the DWSF to final facility standards was completed in November 1996. The facility was placed into service in October 1997 and is covered by the site's existing Part A permit. The DWSF provides pad storage for containerized (drummed or boxed) dangerous wastes, nearly all of which are solid-phase and are also classified as mixed wastes due to their contamination with uranium from the plant's uranium fuel manufacturing activities.

This updated closure plan preserves the closure approach set forth in earlier interim status closure plans for this facility – an approach successfully employed in the Ecology-approved closure of AREVA's historic storage pad, a predecessor to the current DWSF. Approximately 85 percent of the total costs for closure of the DWSF are associated with disposal of the stored waste inventory, with the residual costs being associated with the facility structure itself (surveying, sampling, decontamination, certification, etc.). The closure cost estimate addresses both the inventory and facility-associated closure costs. The Richland site will have an ongoing need for the DWSF. As such, closure of the DWSF is not projected to happen until the time of overall plant closure.

1.1 Regulatory Basis

AREVA's DWSF constitutes a dangerous waste management unit (DWMU) requiring a written closure plan in accordance with WAC 173-303-610(3) and in consideration of Ecology's Guidance for Clean Closure of Dangerous Waste Facilities.

1.2 General Closure Approach

This Closure Plan provides the procedures to be employed to achieve clean closure of the DWSF at AREVA's Richland facility. Dangerous waste closure activities covered under this plan will include disposition (processing/disposal) of the wastes stored at the facility and decontaminating and/or removing container storage components (plastic containment pallets and wooden pallets). Clean closure will further require decontamination/removal of any asphalt that is contaminated above specified closure levels. Closure of the DWSF will include an initial 100% radiological survey of the asphalt and adjacent soil as a sensitive preliminary screening tool to identify areas of potential waste release. Based on the results of this initial screening survey, asphalt removal, investigative soil sampling, and soil removal, followed by confirmation soil sampling, will be conducted as necessary. Any remediated debris or media (asphalt, soil) will be evaluated for disposition per the requirements of AREVA's NRC license and Ecology's WAC 173-303 regulations. All removed materials will be disposed of accordingly. As previously indicated, anticipated level of effort (and costs) for facility remediation at time of closure are expected to be low. This is based on the strict waste management protocols, backed by frequent periodic inspections.

1.3 Closure Objectives

The closure performance standard for dangerous waste management units is listed in WAC 173-303-610(2). This standard requires AREVA to close the DWSF in a manner that:

- Minimizes the need for further maintenance;
- Controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated runoff, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere; and
- Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

This Closure Plan has been developed to guide implementation of closure activities designed to achieve this performance standard and to certify the closure as complete and consistent with the regulatory requirements for clean closure. Impacts to the soil quality, if any, resulting from operation of the DWSF will be determined as part of the closure activities. The numeric cleanup levels for the soils will be calculated according to MTCA Method B unrestricted release closure levels. Decontamination/removal of container storage unit structures and associated soils will be completed as necessary to achieve closure objectives.

1.4 Closure Plan Overview/Organization

This Closure Plan has been prepared in accordance with applicable Ecology regulations and guidance. The plan is organized into four chapters as follows:

- Introduction (Chapter 1.0)
- Facility Information (Chapter 2.0)
- Closure Procedures for Dangerous Waste Storage Facility (Chapter 3.0)
- Schedules, Costs, and Certification (Chapter 4.0)

2.0 **Facility Information**

This section provides information describing the Richland plant site, its facilities, and its operational history.

2.1 Facility Description

This section provides information on the AREVA facility. Section 2.1.1 describes the facility location; Section 2.1.2, the operational history; Section 2.1.3, land use and zoning; and Section 2.1.4, a facility description.

2.1.1 Facility Location

The AREVA facility is located at 2101 Horn Rapids Road just within the northern limits of the city of Richland in Benton County, Washington. The facility definition includes the active manufacturing facility within a fenced area of approximately 53 acres. The land surrounding the facility (which is also owned by AREVA) is generally undeveloped, or in the case of land west of the facility, leased for agricultural purposes.

The facility is located within 320 acres of land owned by AREVA which is within the Horn Rapids Industrial Park. The property is situated at approximately latitude N46°21'003" and longitude W119°18'020" in Sections 15 and 16 of Township 10N, Range 28E, Willamette Meridian. The facility itself is located in the southwest quarter of Section 15 (15-SW/4).

The property is geographically situated within the Pasco Basin in the northern portion of the Columbia Plateau, east of the Cascade Mountains. The Yakima River passes approximately 2

miles to the west, and the Columbia River is approximately 1.5 miles to the east. The nearest residential areas are 1.5 miles to the southwest.

2.1.2 Operational History

The nuclear fuel fabrication plant has been in actual operation since the early 1970's. From 1969-72 the plant was constructed and operated by an operating unit of Jersey Enterprises, Inc. known as Jersey Nuclear Company. Jersey Enterprises, Inc. was a subsidiary of Standard Oil of New Jersey. Jersey Nuclear Company was incorporated in 1972 as Jersey Nuclear Company Inc. In 1983, Jersey Nuclear Company Inc. changed its name to Exxon Nuclear Company, Inc. By Stock Purchase Agreement dated December 31, 1986, Siemens Capital Corporation purchased Exxon Nuclear Company, Inc. from Exxon. Exxon Nuclear Company, Inc. changed its name to Advanced Nuclear Fuels Corporation on January 15, 1987, to Siemens Nuclear Power Corporation on August 1, 1991, and to Siemens Power Corporation (SPC) on July 10, 1992. On February 1, 2001, SPC changed its name to Framatome ANP Richland Inc., coinciding with the merger of the former-SPC's parent company, Siemens AG, with that of the French company, Framatome S.A. On March 19, 2001, Framatome ANP Richland Inc. became a wholly owned subsidiary corporation of Framatome ANP, Inc., the U.S. nuclear operations corporation for the joint venture. On September 1, 2001, Framatome ANP Richland, Inc. merged into, and took the name of, its parent company, Framatome ANP, Inc. Lastly, effective March 15, 2006, Framatome ANP, Inc. changed its name to AREVA NP Inc. Throughout its history, the AREVA facility has operated under a license from the U.S. Nuclear Regulatory Commission (NRC).

2.1.3 Land Use and Zoning

Land use in the general area is agricultural, residential, industrial and commercial, and, to a lesser extent, recreational. The region's agricultural lands are primarily north and east of the Columbia River and south of the Yakima River and are used for dry-land and irrigated crop production and livestock grazing. The incorporated area of Richland is the closest center of residential land use. Regional industrial activities are associated predominately with agriculture or the U.S. Department of Energy's Hanford Site. Commercial usage consists primarily of retail establishments. Recreational land uses in the area include hunting in the unincorporated areas and leisurely pursuits normally associated with incorporated residential areas.

The area immediately surrounding the AREVA property is relatively undeveloped. AREVA owns the adjacent property to the east, west, and south of the facility. With the exception of land to the west which AREVA leases for agricultural purposes, this property is undeveloped and forms a buffer ranging from approximately 500 feet to ¼ mile wide between the facility and other privately owned land. The U.S. Department of Energy-owned Hanford Site lies north and east of the AREVA property and includes three current CERCLA National Priorities List (NPL) sites (the 100-, 200-, 300- Areas) and one former NPL site (the 1100 Area). The 1100 Area is divided into three operable units: 1100-EM-1, 1100-EM-2, and 1100-EM-3. The boundaries of the 1100-EM-1 Operable Unit abut AREVA's property on the north and east. The Horn Rapids Landfill (HRL), which lies in the 1100-EM-1 Operable Unit, lies directly north of the AREVA facility across Horn Rapids Road. The HRL was investigated as a potential source of soil and ground-water contamination (USDOE 1993). The South Pit portion of the HRL lies less than 500 feet northeast of the active portion of the AREVA facility and immediately south of Horn Rapids Road on undeveloped AREVA property. The rest of the 1100 Area in the vicinity of the AREVA property is undeveloped. Further to the south, land use consists of Hanford operations support.

To the south and west of the AREVA property as well as on AREVA property west of the plant, irrigated agricultural activities are conducted by Tony Czebotar Farms. To the southeast, Pacific Eco Solutions (PEcoS) operates a commercial low-level radioactive waste supercompactor. PEcoS is also Part B permitted to thermally treat radioactively contaminated RCRA and PCB wastes. Other neighboring facilities within a one-mile radius include Ferguson Enterprises (0.6 miles SW), Plastic Injection Molding (0.8 miles SW), Allvac-Richland (1.0 miles SW), Applied Geotechnical Engineering and Construction (1.0 mile W), and Hanford Cold Test Facility (1.0 mile NW).

The AREVA property is zoned M-2, Heavy Manufacturing Use. The land surrounding the AREVA property is zoned as follows:

- Federal Hanford Site to the north, northeast, and northwest. The Benton County portion of the Hanford Site, including the eastern half of the 1100 Area, is currently zoned as unclassified. Land use is restricted to activities associated with the nuclear industry; non-nuclear-related activities may be allowed upon approval of U.S. Department of Energy (USDOE) (Benton County Code, Title 11, Ordinance No. 62).
- Agricultural (AG) to the west and southwest.
- Medium industrial (I-M) or heavy manufacturing (M-2) to the east and south.

2.1.4 Facility Description

The primary activity at the AREVA facility is the manufacture of fuel assemblies for commercial nuclear power reactors. Intermediate fuel products may also be supplied, namely uranium dioxide (UO2) powder and UO2 pellets. Manufacturing of these fuel products and associated support activities occur in a number of structures. Key facilities and the primary processes/ activities which occur in each of them are described below.

- Dry Conversion Facility Chemical conversion of UF_6 to uranium dioxide (UO_2) powder and mechanical processing of the powder (powder preparation) for subsequent pellet pressing.
- UO_2 Building Pressing of UO_2 powder into pellets and subsequent pellet sintering and grinding. Loading of finished pellets into fuel rods and assembly of fuel rods and associated hardware into fuel bundles. Loading of products (powder, pellets, fuel rods, assemblies) for shipment. Recovery of uranium via the ammonium diuranate (ADU) process. Bulk UO_2 storage. Analytical laboratory and UF_6 cylinder washing activities.
- Specialty Fuels (SF) Building Production of UO_2 fuel pellets (blending, pressing, sintering, grinding) containing neutron absorber additive. Fuel rod fabrication activities. Housing of the Solid Waste Uranium Recovery (SWUR) incinerator.
- Engineering Laboratory Operations (ELO) Building Dissolution and solvent extraction processing of uranium fuel scrap and other uranium containing residues for removal of contaminants and recovery of uranium. Laboratory facilities for research and development activities in support of fuel fabrication and related functions.
- Ammonia Recovery Facility (ARF) Recovery of ammonium hydroxide and uranium from liquid process effluents. Temporary tank accumulation of liquid process effluents.
- Modular Extraction Recovery Facility (MERF) Sorting and recovery of uranium from contaminated solid wastes.

- Product Development Test Facility (PDTF) Hydraulic, heat transfer, and mechanical/ seismic testing of fuel assemblies.
- Machine Shop Mechanical component operations.
- Shipping Container Refurbishment Facility Maintenance, cleaning and painting of product shipping containers; mechanical fabrication activities.
- Maintenance Shop Maintenance craft shops and offices.
- North Tank Farm Tank storage of liquid chemical feed and product materials (hydrofluoric acid, anhydrous and aqua ammonia, sodium hydroxide, nitric acid, nitrogen)
- Carpenter Shop Carpentry/Painting activities.
- Fuel Services Building (Building 9) Miscellaneous production support activities, including computer operations. Fuel bundle defabrication activities.
- UF_6 Cylinder Recertification Facility Testing and inspection for the recertification of UF_6 cylinders.

3.0 Closure Procedures for the Dangerous Waste Storage Facility

3.1 Waste Management Unit Description Summary

The waste management unit addressed in this Closure Plan consists of the DWSF located in the southeast corner of the fenced AREVA facility as shown in Figure 1. Information regarding the physical configuration and operation of the container storage unit is presented below.

Solid-phase mixed wastes (radioactive wastes which also designate as chemically dangerous under Ecology regulations) from plant operations are stored primarily in 55-gallon drums and to a lesser extent in large metal boxes. All containers (drums) with free liquids present are stored on secondary containment pallets. The DWSF is also used to store non-dangerous, radioactive wastes in drums and boxes.

The base of the DWSF is constructed of minimum 2-inch thick asphalt pavement. The covered area of the facility is partially bermed and sloped to prevent stormwater run-on. In addition all containers that are stored at the DWSF are elevated on pallets or skids to prevent contact with stormwater. The DWSF is inspected on a weekly basis at a minimum, with an annual summary of any spill/cleanup events compiled and kept on file by Environmental, Health, Safety & Licensing (EHS&L). These summaries document a continued lack of chemical or radiological contamination of the DWSF structures.

All containers used to store wastes at the DWSF are strong-tight containers appropriate for the type of waste stored. The container material is selected to be compatible with the waste contained, which in most cases translates into steel drums or boxes. Containers used to store nitric acid-contaminated wastes are made of high density polyethylene (HDPE), which is compatible with the waste stored.

3.2 Waste Inventory Description

A range of dangerous wastes originating from the various on-site processes and legacy operations is stored at AREVA's DWSF. Based on successful efforts to minimize the ongoing generation of mixed wastes and to find disposal options for certain legacy wastes, wastes stored at the pad are decreasing with respect to type and overall volume.

Table1 provides a summary of the major categories of dangerous (primarily mixed) wastes stored at the DWSF. Table 1 also provides a summary of the chemical constituents present in each type of waste. Data associated with the containerized dangerous wastes were derived from chemical analyses of the wastes for the purpose of formal designation and through process knowledge (i.e., knowledge of the feed chemicals for a particular process and an understanding of the chemical reactions which occur so that the components of the process waste stream are known). This waste constituent knowledge provides the necessary information for the selection of analytical parameters to be utilized in the waste pad closure process.

As indicated in Table 1, the primary waste categories managed at the DWSF are mixed waste filter cakes, used ventilation system filters, nitric acid-contaminated media, and organic wastes/solvent-contaminated wastes. Filter cakes are generated via the dewatering of sludges and slurries using filter presses, primarily in the uranium recovery operations in the Engineering Laboratory Operations Building. In addition to these currently generated filter cakes, some legacy filter cakes left over from past lagoon inventory processing activities are stored at the DWSF. These legacy filter cakes are used to dilute down currently generated filter cakes to meet disposal site radiological acceptance criteria. The filter cakes typically designate as state-only toxic and/or state-only corrosive.

Mixed waste used ventilation system filters are generated in radioactive material processes that also utilize hazardous chemicals, e.g., the ammonium diuranate (ADU) chemical conversion line. The filters include high efficiency particulate absolute (HEPA) filters and the pre-filters that protect the HEPAs. These fillers typically designate as state-only toxic and/or corrosive.

Nitric acid-contaminated media consist primarily of sock/cartridge filters removed from process systems handling nitric acid-based uranium solutions. A secondary minor stream includes rags and other solid wastes that have contacted nitric acid-based uranium solutions via spill cleanups, maintenance, etc. These nitric acid-contaminated mixed wastes designate as state-only toxic and corrosive.

Organic wastes/solvent-contaminated wastes are a combination of currently generated wastes (radiologically contaminated paint wastes and solvent rags) and legacy wastes (e.g., radiologically contaminated Freon sludges and organic liquids). Successful efforts to minimize current generation and to dispose of legacy wastes have significantly diminished this waste category. These wastes typically designate for F-listed solvents, state-only toxicity, or corrosivity. Certain of these wastes are liquids and therefore are stored on secondary containment pallets.

3.3 Maximum Inventory Disposition Pathways and Costs

As described in Section 1.2, "General Closure Approach", closure of the DWSF will proceed beginning with the removal, processing, and disposal of all stored wastes. Pathways for the disposition of wastes currently managed at the DWSF have become more straightforward for a number of reasons, most notably successes in eliminating/minimizing mixed waste generation across the site; completion of the processing of a significant inventory of legacy wastes for uranium recovery in the plant's Modular Extraction/Recovery Facility (MERF); and continued expansion of viable commercial treatment options for certain other legacy wastes. The site's most significant mixed waste streams (filter cakes and ventilation filters) are directly disposable at AREVA's contracted mixed waste disposal site. The other significant segment are those wastes being held with no currently identified disposal option. As previously noted, this is becoming a steadily smaller segment due to successes in waste minimization and in locating viable treatment/disposal options.

Table 2 provides volumes and costs for disposition of the current inventory managed at the DWSF. The volume of waste amenable to direct offsite shipment varies somewhat as wastes are accumulated for shipment, and then shipped. The volume in Table 2 is considered typical but also somewhat conservative in that the legacy lagoon treatment-related filter cakes are being steadily worked off and not replaced. The volume of wastes with no identified disposal option is more likely to decrease (due to success in identifying disposal options) than to increase (due to very low current generation rates).

3.4 DWSF Closure

The following sections address methods for closing the DWSF. Container storage unit components that will be investigated include asphalt, surface soil directly adjacent to the asphalt pad (minimum 18" or as needed to characterize detected contamination), and soil underlying the asphalt pad if an initial radiological survey or past annual DWSF evaluations indicate an area of interest or the location of a past spill. The closure approach mirrors the closure approach previously approved for, and successfully implemented at, the historic waste pad.

3.4.1 Dangerous Waste Storage Facility

Waste that has historically been stored on the DWSF is contaminated with uranium, which, because of its physical properties, is an excellent indicator constituent. Uranium is a long-lived radioactive element that is not subject to degradation or volatilization; emits alpha, beta, and gamma radiation; and, when spilled on asphalt, has shown that it is not significantly mobile. In AREVA's typical waste forms, the uranium is either in the form of uranium oxides or other uranium-bearing compounds. In documented releases to asphalt, uranium has demonstrated a pattern of very localized contamination with no migration through the asphalt to the underlying soil. The majority, albeit infrequent number, of historic documented failures of waste containers at AREVA have been from nitric acid-contaminated wet waste, which contains soluble uranium in the form of uranyl nitrate (UN) or its associated soluble salt–uranyl nitrate hexahydrate (UNH). Containers containing uranium as insoluble uranium oxide powder have an even more infrequent history of leakage and any uranium released would be even less likely to dissipate or migrate. All documented spill sites are cleaned and/or fully remediated as required when the spill occurred.

To capitalize on these excellent indicator characteristics of uranium, a radiological screening survey capable of detecting beta and gamma radiological contamination from uranium will be performed on the structural surface areas of the DWSF. Alpha radiation will not be used as a screening tool because of probable matrix interferences. The entire asphalt pad will be surveyed, including the soil that is directly adjacent to the edges of the asphalt pad. The radiological survey will be performed by qualified health and safety technicians under the technical guidance of a health physicist or radiological safety supervisor using a Ludlum Floor Monitor, Model 239-1F (Figure 2) or instrument with equivalent or better detection capabilities. The instrument will be calibrated using known standards. A chalk line grid will be set up prior to the radiological survey to ensure that the total surface area of the DWSF is covered by the survey.

Testing with the Ludlum Floor Monitor has shown that the instrument's detection capabilities are sufficient to detect uranium on asphalt in quantities as small as 0.8 gram uranium. A test was performed with the Ludlum Floor Monitor using a standard solution with a known amount of uranium. The standard solution is utilized to represent a release of uranium-contaminated mixed waste liquid from a drum onto the surface of the DWSF. (In reality, very few drums on the DWSF contain liquids and those that do are on double containment pallets. Drums of solid-phase wastes are not double contained but are far less likely to release their contents if

breached). The solution was poured onto a piece of asphalt and allowed to absorb into the asphalt until there was no visible moisture on the surface. The instrument was then pushed over the contaminated area of the asphalt; the survey meter response was over 25 times the background level.

The average uranium content of the waste containers stored at the DWSF is approximately 150 grams of uranium per container. This uranium is intimately mixed with the chemical constituents responsible for designation of these wastes as dangerous (mixed) wastes. With a detection capability of 0.8 g of uranium on asphalt, the Ludlum Floor Monitor has the capability to detect a very small release of mixed dangerous chemical/radioactive material from a stored waste container.

Any contaminated areas above a radiological threshold that are found during the initial screening of the DWSF and associated soils will be marked and investigated upon completion of the initial radiological survey. If contamination is found on the asphalt pad, the affected asphalt and 6" of peripheral asphalt will be marked and removed by hand or using standard construction equipment. After removal, the contaminated asphalt will be designated and managed appropriately. The soil underlying any removed asphalt will be surveyed for radiological contamination. If radiological contamination of the soil is detected, a soil sample will be collected and analyzed for the chemical parameters listed in Table 3. These parameters were selected based on the chemical constituents present in the containerized wastes stored at the DWSF (see Table 1). If soil removal is necessary, the contaminated soil and 6"of peripheral soil will be removed, designated, and managed appropriately. The location of all radiologically contaminated areas will be recorded in a field notebook and noted on a detailed diagram of the DWSF.

Any soil contaminated above established MTCA Method B unrestricted release levels will be excavated and evaluated per WAC 173-303 and NRC guidelines prior to disposal.

3.4.2 Solvent Contaminated Wastes

Solvent-contaminated oil, solvent rags, and Freon 113 wastes have historically been managed at the DWSF. These wastes are radiologically (uranium) contaminated mixed wastes that contain chemical constituents not present in wastes stored on other non-covered portions of the DWSF. These drums, as with all containers on the pad, are monitored via weekly inspections, at a minimum, and are stored under a covered portion of the DWSF. Those that contain liquids are stored on double containment pallets. No additional organics analyses will be performed on this area of the facility unless a spill of a drum containing these constituents was released directly to the asphalt. Such a spill would be documented in the DWSF operating log as well as in spill files maintained by EHS&L In the event expanded sampling is necessary, the list of parameters to be analyzed is included in Table 4.

3.4.3 Removal of Contaminated Soil

Soil that is contaminated above MTCA Method B numeric unrestricted release levels will be excavated by hand or standard construction equipment and placed in either 55 gallon drums or 90-cubic foot steel burial boxes. Soil that is excavated will be evaluated per WAC 173-303 and NRC requirements and managed appropriately.

3.4.4 Sampling Parameters

The lists of analytical parameters (Tables 3 and 4) are based on process knowledge and formal designations of the waste that is, or has been, stored at the DWSF. Appendix A, the Sampling and Analysis Plan for the DWSF, includes justification of chosen sampling parameters.

3.5 Subsoil Verification Sampling

Subsoil verification sampling will be performed only in the event that analytical results from a soil sample exceed the MTCA Method B unrestricted release cleanup levels. Verification sampling will be performed after contaminated soil has been removed to ensure that clean closure limits have been met.

This sampling phase will involve collecting samples from the uppermost three inches of subsoil from the remediated area and submitting them for confirmation analysis as outlined in the Sampling and Analysis Plan in Appendix A. Samples will be submitted for the same analytes as previously analyzed from that location. Verification sampling will follow any necessary remediation activity. All parameters will be below MTCA clean closure levels using unrestricted release cleanup levels before closure is determined to be complete.

3.6 Containerization and Transport

Any soil or asphalt that is removed will be placed in strong tight containers. If the soil or asphalt designates as a dangerous non-radioactive waste per WAC 173-303, it will be shipped via private waste transporter to a licensed waste treatment or disposal facility. Any radioactive non-dangerous soil or asphalt will be used as fill in boxes to be buried at the U.S. Ecology landfill facility located on the Hanford Reservation. Any soil or asphalt that is determined to be a mixed waste (radioactive with dangerous waste constituents) will be containerized and shipped to an appropriate mixed waste treatment/disposal facility. All waste disposal will be conducted in accordance with Ecology and NRC regulations.

3.7 Ancillary Closure Activities

3.7.1 Groundwater Monitoring

AREVA has historically conducted groundwater monitoring on up to seventeen monitoring wells per quarter. Of these seventeen monitoring wells, thirteen are downgradient from the DWSF. Current groundwater contamination is attributed to past liquid releases from a legacy impoundment system and associated underground waste lines. This impoundment system has been successfully closed in accordance with Ecology clean closure criteria. Groundwater monitoring will continue as a means to verify the long term effectiveness of this cleanup action. Past groundwater sampling results have not implicated operation of the DWSF as a source of groundwater contamination. Groundwater monitoring is not required for the sake of the DWSF operations.

3.7.2 Security Systems

AREVA's facility perimeter fences, video surveillance equipment, and locked access gates restrict unauthorized entry to the operating portions of the facility. Twenty-four hour guards regulate access to the facility through all entrances. AREVA employees and contractors are issued badges. Any person entering the facility must present a badge for access and all vehicles must pass a visual inspection. All personnel on-site are required to display their badges at all times for identification.

4.0 **Schedules, Costs, and Certification**

4.1 Closure Schedule and Certification

Activity	Schedule
Initiation of Section 3.4 closure activities at DWSF	Within 60 days of Plan approval
Completion of closure activities at DWSF	Within 120 days of Plan approval
Closure certification for DWSF	Within 150 days of Plan approval

4.2 Closure Cost Estimate

The costs for closure of AREVA's containerized dangerous waste storage facility will be the inventory disposition costs (see Table 2) plus the costs associated with characterizing and remediating (as required) the physical structures (asphalt, containment pallets, etc.) and soil. Closure costs associated with the physical structures are depicted in Tables 5 and 7 for labor and non-labor costs, respectively. As discussed earlier in Section 1, the costs reported in this closure plan for the DWSF are the disposition costs for the stored waste inventory plus the physical structure/environmental closure costs (which are relatively minor compared to the inventory costs). The total costs, with contingency, are summarized below and reflect the total amount for which AREVA must provide financial assurance related to its containerized dangerous waste storage pad activities.

Table 2 Maximum Inventory Disposition Costs	$506,876
Table 5 Container Storage Area Closure Labor Costs	$22,922
Table 7 Container Storage Area Closure Non-Labor Costs	$62,305
Subtotal	$592,103
Contingency (10%)	$59,210
TOTAL	$651,313

4.3 Financial Assurance Mechanism for Closure

Financial assurance for closure activities at AREVA's Richland nuclear fuel fabrication facility is provided by a letter of credit and associated standby trust agreement. These financial assurance instruments are on file with Ecology's Hazardous Waste and Toxics Reduction Program office.

4.4 Closure Certification

AREVA will submit to Ecology by registered mail, certification that the waste management unit has been closed in accordance with the specifications of this Closure Plan per the closure certification schedule provided in Section 4.1. The closure certification will be signed by the appropriate company official and signed and stamped by an independent qualified registered professional engineer.

Table 1 Primary Containerized Dangerous Wastes Stored at DWSF

Waste Type	Chemical Constituents
Mixed Waste Filter Cakes	State-Only Corrosive, Ammonium Nitrate, Ammonium Fluoride
Mixed Waste HEPA Filters	Ammonium Nitrate, Ammonium Fluoride, State-Only Corrosive
Mixed Waste Prefilters	Ammonium Nitrate, Ammonium Fluoride, State-Only Corrosive
Nitric Acid Contaminated Media	Nitric Acid, Ammonium Hydroxide, State-Only Corrosive
Organic/Solvent Contaminated Wastes	F-Listed Solvents (Acetone, MEK, Freon, etc.), State-Only Toxicity (e.g., ethylene glycol, TBP, corrosivity)

Table 2 Inventory Disposition Pathways and Costs

Disposition Pathway	Volume, ft^3	Total Cost, $
Direct disposal at contracted mixed waste disposal site	1,412	238,229
No current disposal option	247	268,647
TOTAL	1,659	506,876

Table 3 Analytical Parameters List

Analyte	SW-846 Method	Container	Preservative	Hold Time
Fluoride (soluble)	340.2	8 oz. Glass	Cool 4 C	7 days extraction 28 days analysis
Nitrate/Nitrite as N (soluble)	300.0	8 oz. Glass	Cool 4 C	7 days extraction 48 hours analysis
Ammonia/Ammonium as N (soluble)	350.3	8 oz. Glass	Cool 4 C	7 days extraction 48 hours analysis
Gross alpha/beta	900.0	8 oz. Glass	Cool 4 C	6 months

Table 4 Expanded Analytical Parameters List

Analyte	SW-846 Method	Container	Preservative	Hold Time
Fluoride (soluble)	340.2	8 oz. Glass	Cool 4 C	7 days extraction 28 days analysis
Nitrate/Nitrite as N (soluble)	300.0	8 oz. Glass	Cool 4 C	7 days extraction 48 hours analysis
Ammonia/Ammonium as N (soluble)	350.3	8 oz. Glass	Cool 4 C	7 days extraction 48 hours analysis
Gross alpha/beta	900.0	8 oz. Glass	Cool 4 C	6 months
Acetone	8260	8 oz. Glass	Cool 4 C	14 days
Freon 113 1,1,2-Trichloro-1,2,2-Trifluoroethane)	8260	8 oz. Glass	Cool 4 C	14 days
Methyl Ethyl Ketone	8260	8 oz. Glass	Cool 4 C	14 days
Xylene	8260	8 oz. Glass	Cool 4 C	14 days
Toluene	8260	8 oz. Glass	Cool 4 C	14 days
RCRA Metals	1311	8 oz. Glass	Cool 4 C	6 months

Table 5 Dangerous Waste Storage Facility Closure Labor Costs

Work Category	Work Activity	Labor Required, Days	Labor Cost, $[*]
Planning and Preparation	Preparation and submittal of regulatory required plans and documents	Safety Eng., 10	4,490
	Development of internal work plans and safety plans	Safety Eng., 2	898
	Procurement of special equipment	Field Eng., (avg.), 2	584
	Special training for remediation workers	Safety Eng., 1 Field Eng., (min.), 1 Laborer (semi-skilled), 1	449 227 340
	Environmental characterization survey-radiological and chemical	Field Eng., (avg.), 4 Field Eng., (min.), 10 Laborer (semi-skilled), 4	1,168 2,270 1,360
Decontamination/Demolition	Surveying and spot removal of contaminated asphalt	Field Eng., (avg.), 1 Laborer (semi-skilled), 2	227 680
	Decontamination of 20 double containment pallets	Field Eng., (min.), 5	1,135
Restoration	Spot replacement of contaminated asphalt previously removed	Laborer (semi-skilled), 3	1,020
Final Survey	Conduct of final radiation survey; collection of follow-up chemical samples	Field Eng., (min.), 30 Field Eng., (avg.), 2 Laborer (semi-skilled), 2	6,810 584 680
Total Labor Costs			22,922

[*] Costs are based on Worker Unit Cost Schedule provided as Table 6.

Table 6 Worker Unit Cost Schedule* - Dangerous Waste Storage Facility

Labor Cost Component	Safety Engineer	Field Engineer (Avg.)	Field Engineer (Min.)	Laborer (Semi-Skilled)
Salary & Fringe ($/yr.)	81,994	53,414	41,454	60,778
Overhead Rate (%)	29.3	29.3	29.3	32.3
Profit on labor (%)	10	10	10	10
Total Cost Per Year, $	116,620	75,970	58,960	88,450
Total Cost Per Work Day, $**	449	292	227	340

* Data derived from RS Means Environmental Remediation Cost Data, 11th Edition, 2005 and RS Means Building Construction Cost Data, 64th Edition, 2006.

** Based on 260 work days per year.

Table 7 Dangerous Waste Storage Facility Closure Non-Labor Costs

Cost Category	Cost Component Description	Unit Cost, $	Total Cost, $
Packing Material	Six 55-gal drums for packaging of contaminated asphalt	15	90
Disposal	Disposal of 45 ft^3 of contaminated asphalt	227/ft^3	10,215
Equipment/Supplies	Radiation screening instrument	10,000	10,000
Laboratory	Analysis of 48 samples for radiological and non-radiological chemical constituents for characterization and final surveys	250	12,000
Miscellaneous	Ecology closure certification NRC final survey		10,000 20,000
Total Non-Labor Costs			62,305

Figure 1 Dangerous Waste Storage Facility

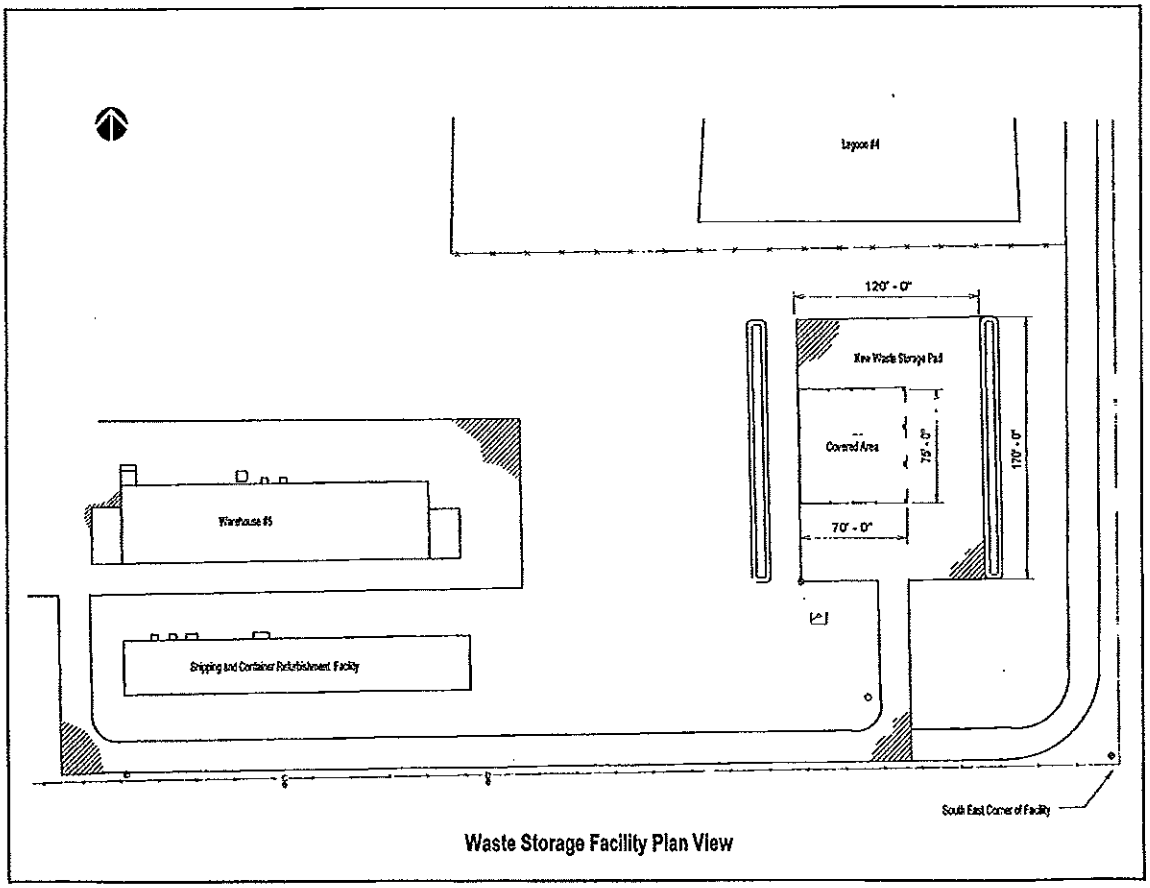


Figure 2 Ludlum Gas Proportional Radiological Survey Instrument

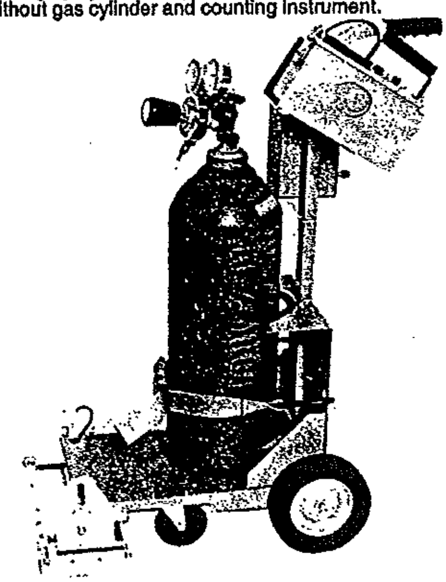
LUDLUM MEASUREMENTS, INC.
P.O. Box 810 / 501 Oak Street
SWEETWATER, TEXAS 79556
Phone: 800/622-0828(USA), 915/235-5494 FAX: 915/235-4672

SPECIALIZED INSTRUMENTS

MODEL 239-1F FLOOR MONITOR

INDICATED USE: Alpha, Beta, Gamma monitoring.
DETECTOR SIZE: 18.250"L X 6.250"W X 0.75"D.
ACTIVE AREA: 425 cm^2.
WINDOW MATERIAL: Please specify one of the following:
a) 0.4 mg/cm^2 (1 layers metalized mylar) for alpha, beta & gamma.
b) 0.8 mg/cm^2 (2 layers metalized mylar) for alpha, beta & gamma.
c) 3.9mg/cm^2 (1 layer metalized mylar, one layer 3.5 mg/cm^2 mylar) for beta & gamma.
d) 7.9mg/cm^2 (1 layer metalized, mylar one layer 7.5 mg/cm^2 mylar) for gamma.
Please note: If window thickness is not specified, type b) will be used on detector.
WINDOW PROTECTIVE SCREEN: 73% open.
ADJUSTABLE HEIGHT: Detector adjusts from 0.125" to 3" from floor.
OPERATING VOLTAGE: Alpha - 1000-1200 volts. Beta/Gamma - 1600-1800 volts at 2 mV input sensitivity.
EFFICIENCY: Alpha - 35 %; Beta - 50% (Sr-98 and Y-90); Gamma - 1 %. Efficiencies are expressed in 2pi geometry and calculated with probe height fixed at 3/16" distance from floor.
GAS RECHARGE: Unit may be operated without gas flow. (Flush at 220 cc/min for 10 min. and recharge every 2 hours.)
CONNECTOR: series "C" type.
FLOW METERS: Adjustable IN - 0-240 cc/min. OUT flowmeter 0-240 cc/min.
QUICK-CONNECTS: Swaglock, 1/8" mpt to 1/4" OD tubing.
GAS CYLINDER BRACKET: Integral bracket accepts up to a number 2 bottle (9" diameter x 26"H).
Note: Gas cylinder is not included.
COUNTER: LMI Model 12 Count Ratemeter. See specs on page 2 of this catalog. Optional: LMI Model 2221 Scaler/Ratemeter or the Model 2350 Data Logger. See specs in this catalog.

CART:
Construction - rugged 1" square steel tubing.
Handle height - 3.5 feet.
Length - 17" including wheels but excluding handle.
Wheel size - rear 8" and front 3" swivel.
Finish: Computer beige polyurethane paint.
Weight: 25 lbs. without gas cylinder and counting instrument.



SAMPLING AND ANALYSIS PLAN

CLOSURE OF THE DANGEROUS WASTE STORAGE FACILITY

AREVA NP INC.

RICHLAND, WASHINGTON

1.0 Sampling Objectives

The objective of this Sampling and Analysis Plan (SAP) is to evaluate the environmental conditions of asphalt pavement and soils directly adjacent to or underlying the Dangerous Waste Storage Facility (DWSF) in light of Washington State's Model Toxic Control Act (MTCA, Chapter 173-340 WAC) and Dangerous Waste Regulations (Chapter 173-303 WAC). This SAP establishes the procedures for sampling and analysis of debris, soils or other contaminated media that may be discovered during closure of the DWSF.

2.0 Organization Responsibilities

The project manager is responsible for project oversight, which includes: ensuring the project is performed according to this SAP, determining sampling locations, field oversight of all activities related to this SAP, maintaining detailed field notes, acting as the laboratory contact, and producing the final report. The project manager will be a qualified engineer from the Environmental Health, Safety, and Licensing (EHS&L) group at AREVA NP Inc. (AREVA). All sampling equipment needed to complete this project will be supplied by EHS&L.

3.0 Project Schedule

This SAP will be implemented by AREVA with all phases of the onsite work being overseen by a designated project manager. Closure of the DWSF will be implemented per timeline requirements as listed in Ecology's Guidance for Clean Closure of Dangerous Waste Facilities (#94-111), Section 7.0. The key factor in closing the DWSF will be the processing and/or disposal of the existing inventory at the time of closure. A schedule for closure is included in Section 4.1 of the Closure Plan.

4.0 Quality Assurance

The overall quality assurance objective is to ensure that data of known and defensible quality are obtained during the study. To achieve that objective, all field activities related to sampling will be conducted in accordance with the methods described herein.

Analytical data generated by the sampling and analysis activities will be validated to ensure that the precision and accuracy of laboratory analytical results were within established guidelines. Collection of quality control samples is discussed in the following section.

5.0 Sampling

Waste that has historically been stored at AREVA's DWSF is contaminated with uranium, which, because of its physical properties, is an excellent indicator surrogate constituent. Uranium is a long-lived radioactive element that is not subject to degradation or volatilization; emits alpha, beta, and gamma radiation; and, when spilled on asphalt, has demonstrated that it is not mobile. In even its common soluble forms (uranyl nitrate or its salt, uranyl nitrate hexahydrate), uranium releases have demonstrated a pattern of very localized contamination with no migration through the asphalt to the underlying soil.

Because uranium is an excellent indicator of a possible release, any areas that are radiologically contaminated, including 6" of peripheral asphalt, will be investigated as possible release sites. A radiological screening survey capable of detecting beta and gamma radiological contamination from as little as 0.8 gram of uranium will be performed on the entire surface area of the DWSF. Alpha radiation will not be used as a screening tool because of probable matrix interferences. The area to be surveyed includes the asphalt at the DWSF and the 18" of soil that is directly adjacent to the edges of the asphalt pad. The radiological survey will be performed by qualified health and safety technicians under the guidance of a health physicist or radiological safety supervisor using the gas proportional Ludlum Floor Monitor, Model 239-IF (Figure 1) or an instrument with equivalent or better detection capabilities. The instrument shall be calibrated using known standards. A chalk line grid will be set up prior to the radiological survey to ensure that the total surface area of the DWSF is covered by the survey.

Investigation of radiological hot spots will include removal of contaminated asphalt and surveying underlying soil. If soil is radiologically contaminated, a sample will be taken and analyzed for the parameters listed in either Table 8 or Table 9, depending on the location of the sample. Soil from directly beneath any radioactively contaminated asphalt under the covered portion of the DWSF will be analyzed for the parameters listed in Table 9 only if a known release of solvent contaminated waste is known to have occurred. All liquid bearing wastes are stored on secondary containment pallets. Radioactively contaminated soil under other areas of the DWSP will be analyzed for the parameters listed in Table 1.

Sampling parameters are based on process knowledge of the waste streams that are stored at the DWSF. A discussion of those waste types is provided in Section 3.2 of the Closure Plan, including information on the chemical constituents associated with those wastes. In addition to the noted chemical constituents, the wastes are contaminated with uranium from the plant's uranium fuel fabrication activities.

5.1 Sampling Procedures

The following procedures are to be used by all field personnel when conducting soil or asphalt sampling activities in conjunction with the closure of the DWSP. All field activities will be documented in a bound field notebook using a pen with permanent ink. Information to be recorded in the notebook includes the following:

- Date
- Weather conditions
- Names of field team members
- Times of site arrival and departure
- Documentation of all field activities
- Any equipment malfunction
- An accurate depiction of the survey grid lines
- Sampling locations
- Sample information
- The location of all radiologically contaminated areas (per section 3.4.1)
- Odd or unusual occurrences
- Site visitors

The field notebook will be signed by the Field Supervisor at the end of each day of fieldwork. The sampling procedures are outlined in the following sections.

5.2 Sampling Locations

The radiological survey will consist of setting up a chalk line grid with the lines spaced 18" apart on the asphalt of the DWSF. The first 18" of soil directly adjacent to the DWSF will also be marked to ensure that the total surface area is covered by the survey. The Ludlum Floor Monitor will then be pushed over the entire gridded area at a speed that will be determined by the responsible health physicist or radiological safety supervisor. Any locations that are determined to be radiologically contaminated will be marked and further investigated upon completion of the survey. Any soil that is underlying radiologically contaminated asphalt which requires removal will be surveyed with the Ludlum Floor Monitor after the asphalt has been removed, and sampled if necessary.

The number of soil samples taken is dependent upon the number of radiologically contaminated areas that are detected during the survey of the entire DWSF and adjacent areas. All soil locations that are radiologically contaminated will have discrete grab samples taken from the uppermost three inches of soil.

Actual sampling locations will be recorded for future reference by measuring the distance between the sampling location and a minimum of three fixed reference points and recording these measurements in the field notebook. A sketch will be drawn to indicate the location relative to these structures. Photographs will be taken at each sampling location.

5.3 Sampling Parameters and Frequency

One soil sample will be collected from each sampling location and submitted to the laboratory for analysis. All soil samples taken from areas other than the covered storage area will be analyzed for the constituents listed in Table 8. All samples of soil and asphalt taken from the covered portion of the DWSF in areas that have had documented spills of solvent contaminated wastes will be analyzed for the constituents listed in Table 9.

After samples have been taken, sampling locations will be covered with plastic to prevent rainwater or other contaminants from entering the sampling location. Upon return of the sample results, if no contamination is found above MTCA Method B unrestricted release levels, the sample locations will be backfilled. If sample results show that contamination is present above the MTCA Method B unrestricted release levels, additional soil will be removed and confirmatory sampling will be performed. This process will continue until sample results show that the contamination levels are below the MTCA Method B cleanup limits. All soil that is removed will be evaluated per WAC 173-303 and NRC requirements and managed appropriately.

5.4 Sample Collection

Soil samples will be collected from the uppermost three inches of exposed soil after the asphalt is removed. The asphalt will be removed using standard construction equipment. If soil is not covered by asphalt, the uppermost three inches of exposed soil will be sampled. The samples will be collected by hand using a decontaminated stainless steel scoop and placed in eight-ounce glass sample containers provided by the laboratory. The glass sample containers will be filled to the lip to minimize head space. Disturbance to the soil samples shall be minimized as much as possible. Any samples collected for analysis of semi-volatile constituents will be collected first at each sampling location to minimize loss during sample collection. The volume of soil required for each type of laboratory analysis is specified in Tables 8 and 9.

If necessary, asphalt samples will be collected by coring the asphalt with a small coring tool. The asphalt samples will either be placed in glass or plastic containers.

5.5 Sample Documentation

A sample identification label which identifies the sample number, date and time of sampling, matrix, and initials of sampling personnel will be completed and affixed to each sample container immediately after that container has been filled with soil. An example of a sample label is provided in Figure 4. The sample will be sealed in a resealable plastic bag and stored in a cooler with ice.

5.6 Quality Control Samples

Quality control samples will consist of blind duplicates, trip blanks, and equipment rinsate blanks. Equipment rinsate blanks will be collected at the beginning and end of each day by pouring ultra-pure water from AREVA's analytical laboratory over the decontaminated stainless steel sampling scoop and filling sample bottles for analysis.

Trip blanks will be prepared by the laboratory and will not be opened during sampling. One pair of trip blanks will be placed in each cooler that contains samples to be analyzed for volatile or semi-volatile organic analytes.

6.0 Decontamination Procedures

All sampling equipment will be decontaminated prior to use and after sampling at each location to avoid chemical cross-contamination of field samples. Equipment will be decontaminated by washing with a laboratory-grade, nonphosphate detergent and rinsing with deionized water. All field personnel will wear clean nitrite or vinyl gloves when conducting sampling and decontamination procedures.

7.0 Sample Handling And Shipment Procedures

A summary of the sample handling procedures, including types of bottles and preservatives required for each type of soil analysis is provided in Tables 8 and 9. All soil samples will be stored in a cooler with ice immediately after collection. The cooler of filled sample containers, along with sufficient ice to effectively cool the samples during shipment, will be transported by overnight courier to the selected laboratory for analysis. The selected laboratory shall be accredited under WAC 173-50.

7.1 Chain of Custody Procedures

All samples will remain in the custody of the sampling personnel during each sampling day. At the end of each sampling day and prior to the transfer of the samples for offsite shipment, chain-of-custody entries will be made for all samples using a Chain-of-Custody form (Figure 5). One Chain-of-Custody form will be completed for each cooler of samples. All information on the Chain-of-Custody form and the sample container labels will be checked against the sampling log entries, and the samples will be recounted before transferring custody. Upon transfer of custody, the Chain-of -Custody form will be signed by the project manager, sealed in plastic, and placed inside the sample cooler.

A signed, dated custody seal (Figure 6) will be placed over the lid opening of the sample cooler to indicate if the cooler is opened during shipment. All Chain-of-Custody forms received by the laboratory must be signed and dated by the laboratory's sample custodian.

The custodian at the laboratory will note the condition of each sample received as well as questions or observations concerning sample integrity. The sample custodian will also maintain a sample tracking record that will follow each sample through all stages of laboratory processing. The sample tracking records must show the date of sample extraction and sample

analysis. These records will be used to determine compliance with holding time limits during laboratory audits and data validation.

7.2 Data Validation

Analytical results will be reviewed and validated. Appropriate data qualifier codes will be applied to those data for which quality control parameters do not meet acceptable standards. Data quality acceptance criteria are specified in the U.S. Environmental Protection Agency (USEPA) Laboratory Data Functional Guidelines.

8.0 **Confirmatory Sampling**

Any confirmatory sampling that may be conducted will be performed in accordance with the protocols established in this SAP. All guidelines and procedures will be adhered to as implemented in this SAP.

9.0 **Reporting**

The results of this sampling and analysis plan will be reported to Ecology following data validation and evaluation of the laboratory analytical results.

Table 8 Summary of Sampling Requirements

Analyte	SW-846 Method	Container	Preservative	Hold Time
Fluoride (soluble)	340.2	8 oz. Glass	Cool 4 C	7 days extraction 28 days analysis
Nitrate/Nitrite as N (soluble)	300.0	8 oz. Glass	Cool 4 C	7 days extraction 48 hours analysis
Ammonia/Ammonium as N (soluble)	350.3	8 oz. Glass	Cool 4 C	7 days extraction 48 hours analysis
Gross alpha/beta	900.0	8 oz. Glass	Cool 4 C	6 months

Table 9 Summary of Sampling Requirements - Expanded List

Analyte	SW-846 Method	Container	Preservative	Hold Time
Fluoride (soluble)	340.2	8 oz. Glass	Cool 4 C	7 days extraction 28 days analysis
Nitrate/Nitrite as N (soluble)	300.0	8 oz. Glass	Cool 4 C	7 days extraction 48 hours analysis
Ammonia/Ammonium as N (soluble)	350.3	8 oz. Glass	Cool 4 C	7 days extraction 48 hours analysis
Gross alpha/beta	900.0	8 oz. Glass	Cool 4 C	6 months
Acetone	8260	8 oz. Glass	Cool 4 C	14 days
Freon 1 1 3 (1,1,2-Trichloro - 1,2,2-Trifluoroethane)	8260	8 oz. Glass	Cool 4 C	14 days
Methyl Ethyl Ketone	8260	8 oz. Glass	Cool 4 C	14 days
Xylene	8260	8 oz. Glass	Cool 4 C	14 days
Toluene	8260	8 oz. Glass	Cool 4 C	14 days
RCRA Metals	1311	8 oz. Glass	Cool 4 C	6 months

Figure 3 Ludlum Gas Proportional Radiological Survey Instrument

LUDLUM MEASUREMENTS, INC.
P.O. Box 810 / 501 Oak Street
SWEETWATER, TEXAS 79556
Phone: 800/622-0828(USA), 915/235-5494 FAX: 915/235-4672

SPECIALIZED INSTRUMENTS

MODEL 239-1F FLOOR MONITOR

INDICATED USE: Alpha, Beta, Gamma monitoring.
DETECTOR SIZE: 18.250"L X 6.250"W X 0.75"D.
ACTIVE AREA: 425 cm^2.
WINDOW MATERIAL: Please specify one of the following:

- a) 0.4 mg/cm^2 (1 layers metalized mylar) for alpha, beta & gamma.
- b) 0.8 mg/cm^2 (2 layers metalized mylar) for alpha, beta & gamma.
- c) 3.9mg/cm^2 (1 layer metalized mylar, one layer 3.5 mg/cm^2 mylar) for beta & gamma.
- d) 7.9mg/cm^2 (1 layer metalized, mylar one layer 7.5 mg/cm^2 mylar) for gamma.

Please note: If window thickness is not specified, type b) will be used on detector.
WINDOW PROTECTIVE SCREEN: 73% open.
ADJUSTABLE HEIGHT: Detector adjusts from 0.125" to 3" from floor.
OPERATING VOLTAGE: Alpha - 1000-1200 volts. Beta/Gamma - 1600-1800 volts at 2 mV input sensitivity.
EFFICIENCY: Alpha - 35 %; Beta - 50% (Sr-98 and Y-90); Gamma - 1 %. Efficiencies are expressed in 2pi geometry and calculated with probe height fixed at 3/16" distance from floor.
GAS RECHARGE: Unit may be operated without gas flow. (Flush at 220 cc/min for 10 min. and recharge every 2 hours.)
CONNECTOR: series "C" type.
FLOW METERS: Adjustable IN - 0-240 cc/min. OUT flowmeter 0-240 cc/min.
QUICK-CONNECTS: Swaglock, 1/8" mpt to 1/4" OD tubing.
GAS CYLINDER BRACKET: Integral bracket accepts up to a number 2 bottle (9" diameter x 26"H).
Note: Gas cylinder is not included.
COUNTER: LMI Model 12 Count Ratemeter. See specs on page 2 of this catalog. Optional: LMI Model 2221 Scaler/Ratemeter or the Model 2350 Data Logger. See specs in this catalog.

CART:
Construction - rugged 1" square steel tubing.
Handle height - 3.5 feet.
Length - 17" including wheels but excluding handle.
Wheel size - rear 8" and front 3" swivel.
Finish: Computer beige polyurethane paint.
Weight: 25 lbs. without gas cylinder and counting instrument.

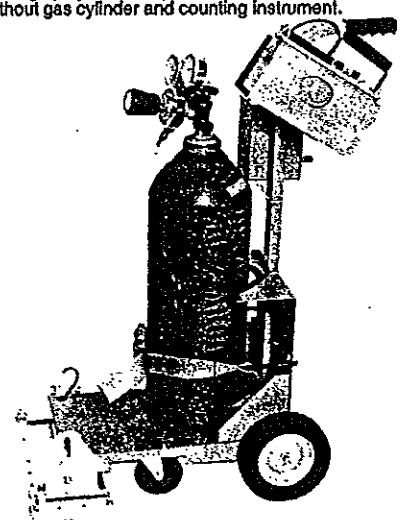


Figure 4 Sample Label

Client: ______________________________

Date Sampled: _________ **Time:** _________

Source: ______________________________

Analysis: ______________________________

Unpreserved, Preserved _______________

Figure 5 Chain of Custody Form

AREVA

AREVA NP INC.

2101 Horn Rapids Road
Richland, WA 99354

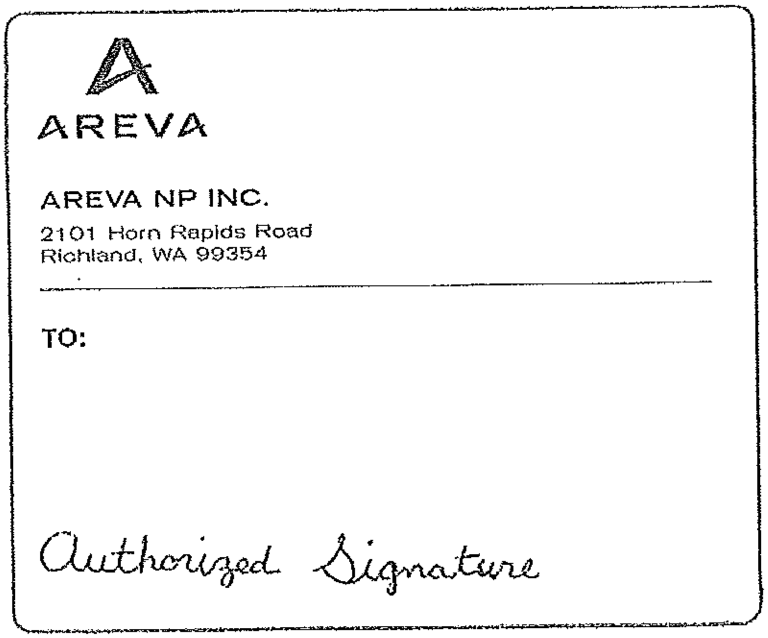
Customer contact:				Project ID		Order ID:						Requested Tests						
Business name:																		
Address:						Number of bottles												
Phone:		FAX:																
Regulatory Authority:	NPDES: ☐ Solid waste: ☐	Drinking water: ☐ Other: ☐																
Lab Use Only	Customer Sample ID (Unique identifier or code)	Collection Date	Collection Time	Matrix														Comments

Signature	Date/Time	Signature	Sample Conditions at receipt:
Collected/ Relinquished by:		Received by:	Temperature (circle): Ambient Cold Frozen
Relinquished by:		Received by:	Containers intact/Lids tight: ☐ VOC vials without headspace: ☐ Labels match custody: ☐
Relinquished by:		Signature	Date/Time
Laboratory receipt:		Pre-log storage:	

Page ______ of ______

Rev 03-14-02

Figure 6 Chain of Custody Seal


AREVA

AREVA NP INC.
2101 Horn Rapids Road
Richland, WA 99354

TO:

Authorized Signature

AREVA NP Inc.

E06 Environmental Protection
E06-04 Miscellaneous Reports

E06-04-005
Version 2.0

Closure Plan for the Dangerous Waste Storage Facility

Date (GMT)	Signed by
05/17/2007 20:13:03	Maas, Loren
Authorization/Title	Document Author

05/17/2007 20:13:48	Maas, Loren
Authorization/Title	Licensing & Compliance Manager

05/23/2007 22:59:58	Gallacher, Vince
Authorization/Title	Conversion & Recovery Manager

05/24/2007 15:26:10	McGrath, Kaela
Authorization/Title	Document Control Approval

Attachment 9-2. Closure Plan for the Component Chemical Waste Tank (E06-04-005)

EHS&L Document

Closure Plan for the Component Chemical Waste Tank

Nature of Changes

Item	Paragraph	Description	Justification
1.	Sections 2.2, 2.3, 3.1, and 3.2	Revised to remove discussions of, and references to, the etch process.	Etch process has been permanently discontinued.
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

List Below any Documents, including Forms & Operator Aids which must be issued concurrently with this document revision:

This Document contains a total of 22 pages excluding the signature page generated by Documentum, the document control application software.

DOCUMENT REVIEW/APPROVAL/DELETION CHECKLIST

All new and/or revised procedures shall be approved by the change author, cognizant manager(s) of areas affected by the changes, and by applicable manager(s) of any function that approved the previous revision of the document unless responsibility for such approval has been transferred to another organization. Also, the procedure shall be approved by manager(s) of functional organizations that provide technical reviews with the exception of the Training Department. Finally, Document Control shall verify that the required approvals have been properly obtained and that any documents that must be issued concurrently are ready to be issued.

Minor Changes: If the proposed changes are limited to editorial and/or administrative changes check the box at the right. The document will be routed directly for review by EHS&L without technical review. All applicable approvals must still be obtained.	☐

Document Reviews			**Document Approvals**	
Purpose/Function of Review	Specify Reviewer(s) (Optional except for change author)	(Check all that apply)	Title of Approver	(Check all that Apply)
Document Control (Automatic)		☒	Document Control (Automatic)	☒
Change Author	LJ Maas	☒	Author	☒
Independent Technical Review	JB Perryman	☒		
Operability Review(s)			Mgr, Richland Operations[1]	☐
Conversion		☐	Mgr, Uranium Conversion & Recovery Operations[1]	☐
Recovery		☐		
Ceramics		☐	Mgr, Ceramic Operations[1]	☐
Rods		☐	Mgr, Rods & Bundles[1]	☐
Bundles		☐		
Transportation		☐		
Components		☐	Mgr, Component Fabrication[1]	☐
Maintenance Review		☐	Mgr, Maintenance[1]	☐
Lab Review		☐	Mgr, Analytical Services[1]	☐
EHS&L Review(s)			Mgr, EHS&L[2]	☐
Criticality		☐	Mgr, Criticality Safety[2]	☐
Radiation Protection		☐	Mgr, Safety, Security & Emergency Preparedness[2]	☐
Safety/Security		☐		
Emergency Preparedness		☐		
MC&A		☐	Mgr, Licensing & Compliance[2]	☒
Transportation		☐		
Environmental		☒		
BWR Product Eng. Review		☐	Mgr, BWR Product Engineering	☐
BWR Core Engineering Review		☐	Mgr, BWR Core Engineering	☐
Codes and Methods Review		☐	Mgr, Codes and Methods	☐
Proj. Eng. & Design Support Review		☐	Mgr, Proj. Eng. & Design Support	☐
Quality Review		☐	Mgr, Quality	☐
Project & Plant Eng. Review		☐	Mgr, Project & Plant Eng.	☐
Purchasing Review		☐	Mgr, Purchasing	☐
Others:		☐	Mgr, Richland Site/Other	☐
Training & Employee Dev.: [3]		☐	Training & Employee Dev.	☐

[1]Note: If approvals include 2 or more product center managers, the Operations manager can be substituted for the applicable product center managers.

[2]Note: If approvals include 2 or more EHS&L functional managers, the EHS&L manager can be substituted for the applicable EHS&L functional managers.

[3]Note: Training department review is required for all procedures that require or affect a Learning Plan and if additional training materials or curriculum must be revised before issuing procedure.

EHS&L Change Impact Evaluation Form		
Document / ECN No*.: E06-04-009		Change Evaluator: LJ Maas
Does the change potentially impact Criticality Alarm System (CAS) coverage?	☐ Yes ☒ No	If yes, explain:
NRC Pre-Approval Evaluation:		
Is NRC Pre-approval (License Amendment) Needed? (Based on "Yes" answer to any of five questions below). (Based on "No" answer to all five questions below).	☐ Yes ☒ No	
1. Does the change create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements of 10 CFR 70.61 (create high or intermediate consequence events) and that have not previously been described in AREVA NP Inc's ISA Summary?	☐ Yes ☒ No	If yes, explain:
2. Does the change use new processes, technologies, or control systems for which AREVA NP Inc. has no prior experience?	☐ Yes ☒ No	If yes, explain:
3. Does the change remove, without at least an equivalent replacement of the safety function, an item relied on for safety that is listed in the ISA Summary?	☐ Yes ☒ No	If yes, explain:
4. Does the change alter any item relied on for safety, listed in the ISA Summary, that is the sole item preventing or mitigating an accident sequence of high or intermediate consequences?	☐ Yes ☒ No	If yes, explain:
5. Does the change qualify as a change specifically prohibited by NRC regulation, order or license condition?	☐ Yes ☒ No	If yes, explain:
Actions Required Prior to or Concurrent with Change Implementation Evaluation:		
Action		**Explanation**
6. Modification / Addition to CAS system or system coverage documentation	☐ Yes ☒ No	If yes, explain:
7. Acquire NRC pre-approval (license amendment)	☐ Yes ☒ No	If yes, explain:
8. Conduct/modify ISA	☐ Yes ☒ No	If yes, explain:
9. ISA Database Modification	☐ Yes ☒ No	If yes, explain:
10. Modification of other safety program information / underlying analyses (PHA, RHA, FHA, NCSA, etc.)	☐ Yes ☒ No	If yes, explain:
Actions required subsequent to Change Implementation Evaluation:		
11. Update safety program information (PHA,RHA,FHA,NCSA, P&ID)	☐ Yes ☒ No	If yes, explain:

* **If this form exists as a part of a document, the document number is not required.**

Table of Contents

1.0 Introduction

This Closure Plan applies to the Component Chemical Waste Tank (CCWT) at the AREVA NP Inc. (AREVA) nuclear fuel fabrication facility in Richland, WA. The CCWT has been operated to-date as a less than 90-day accumulation tank in accordance with WAC 173-303-200. Based on the volume of the CCWT (2000 gallons) and the comparatively low waste generation rate of the process feeding the tank, the 90-day accumulation limit has typically necessitated emptying of the tank by a contracted waste treatment/disposal vendor when the tank is at 20% or less of capacity. Operating the tank as a permitted dangerous waste management unit will serve to limit the hazards and costs associated with unnecessarily frequent tank pump-outs.

1.1 *Regulatory Basis*

The CCWT constitutes a dangerous waste management unit requiring a written closure plan in accordance with WAC 173-303-610(3), including applicable requirements of WAC 173-303-640(8).

1.2 *Closure Performance Standard and General Closure Approach*

The closure performance standard for dangerous waste management units is listed in WAC 173-303-610(2). This standard requires AREVA to close the CCWT in a manner that:

- Minimizes the need for further maintenance;
- Controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated runoff, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere; and
- Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

This Closure Plan has been developed to achieve this performance standard and to allow certification of the closure as complete and consistent with the requirements for clean closure.

AREVA's general approach for closure of the CCWT in a manner that complies with the performance standard for clean closure is as follows:

- Decontaminate all debris surfaces potentially contaminated with dangerous waste to meet the Alternative Treatment Standards for Hazardous Debris (40 CFR 268.45 Table 1).
- For debris surfaces where the "clean debris surface" as defined in the Alternative Treatment Standards" cannot be achieved or conclusively demonstrated, debris may be sampled and analyzed in accordance with an approved sampling and analysis plan to demonstrate that the debris does not exhibit a dangerous waste characteristic or criterion and therefore no longer requires management as a dangerous waste.
- Potentially contaminated debris not amenable to decontamination or post-decontamination inspection/analysis (e.g. small bore piping, valves) will be disposed offsite in accordance with regulations.
- Rinsates derived from the decontamination processes will be disposed of offsite in conjunction with the final tank waste inventory (see Sect. 2.4). Any residual rinsates generated after disposition of the final tank inventory will be collected in suitable containers and sampled for waste designation purposes and disposed of accordingly.

- Based on the tank-in-tank construction of the CCWT, no contamination of the supporting concrete slab with dangerous waste constituents is anticipated. Similarly, based on construction and placement of the CCWT, no contaminated environmental media (soil, groundwater) is reasonably anticipated.

The overall closure process for the CCWT is described below in Section 3.0, Closure Activities.

2.0 Waste Management Unit Description

2.1 *Facility Setting*

The CCWT is located outside of the northwest corner of the Component Center, which in turn is located on the western edge of the AREVA nuclear fuel fabrication facility. A map showing the location of the Component Center and supporting CCWT within the approximately 53-acre fenced AREVA site is provided as Figure 1.

The AREVA facility is located at 2101 Horn Rapids Road just within the northern limits of the City of Richland in Benton County, Washington. The fenced facility is a sub-portion of 320 acres of land owned by AREVA within the Horn Rapids Industrial Park. The plant, which manufactures fuel assemblies for commercial nuclear power reactors and intermediate fuel products for other fuel fabrication facilities, has been in operation since the early 1970s. Now owned by AREVA, the plant has also operated under a number of prior owners/names, most notably Exxon and Siemens. Throughout its operating history, and owing to its processing of special nuclear material [low (<5%) - enriched uranium], the AREVA facility has operated under a license from the U.S. Nuclear Regulatory Commission (NRC).

2.2 *CCWT Description*

The CCWT (Figure 2) is located outdoors just outside of the component pickling area (pickling room), which in turn is located in the northwest corner of the AREVA Component Center. The CCWT is actually a tank-within-a-tank system - a 2000 gallon inner tank and a 3500 gallon external containment tank. Both tanks are made of high density cross-linked polypropylene for full compatibility within the contained waste solutions. The tanks are situated on a 6-inch thick reinforced concrete monolithic slab with thickened perimeter edges. Pipes and fittings associated with the tank are stainless steel or polypropylene and located above-ground. A leak detection system with alarm capability is installed to detect any release of liquids from the inner tank into the containment tank. The CCWT has been provided with review and certification by an independent, qualified registered professional engineer as called for in WAC 173-303-640(2).

2.3 *Waste Inventory Description*

The CCWT manages liquid chemical wastes from the component pickling area within the AREVA Component Center. The chemical wastes are derived from the pickling process, a chemical process applied to stainless steel components to remove any free iron from the component surfaces and impart a corrosion-resistant oxide coating. The components processed consist of the metallic hardware parts (tie plates, rod end caps, spacer components, etc.), exclusive of cladding, used to fabricate nuclear fuel assemblies.

The pickling process utilizes a chemical dip tank. The pickling solution is a combination of deionized water, nitric acid (1-2 Molar), oxalic acid (~5%), and an organic surfactant/wetting agent (<1%). Cycle time for the components is typically about 40 minutes. Batches of spent pickling solution (~27 gallons ea.) are pumped to the CCWT approximately every 2-3 weeks. Between batches the tank is rinsed with water, with the rinsate also routed to the CCWT.

The waste managed in the CCWT is designated as D002, Corrosive.

2.4 *Maximum Inventory Disposition*

The corrosive liquid wastes managed in the CCWT are disposed of via a contracted offsite waste disposal contractor. No onsite pre-conditioning or treatment is required. The capacity of the inner tank which contains the waste is 2000 gallons; however the tank is managed to less than 85 percent of capacity (1700 gallons) via electronic level indication, with alarm capability. For the sake of closure planning, the full 2000 gallons will be utilized to account for the water rinsate that will be generated from the washdown of the tank interior and the annular cavity between the inner and outer tanks (see Section 3.0, Closure Activities, below). The disposal cost for the final tank inventory including washdown rinsate is included in Table 2 of Section 5.1, Closure Cost Estimate.

3.0 **Closure Activities**

This section addresses activities that will be completed during closure of the CCWT. The following activities are described:

- Removal of wastes and waste residues (Section 3.1)
- Decontamination of debris surfaces (Section 3.2)
- Removal of tanks and associated piping (Section 3.3)
- Cleaning of concrete support pad (Section 3.4)
- Confirming clean closure (Section 3.5)
- Sampling and analysis and constituents to be analyzed (Section 3.6)
- Role of the independent registered professional engineer (Section 3.7)
- Closure certification (Section 3.8)

3.1 *Removal of Wastes and Waste Residues*

AREVA will remove all dangerous waste and waste residues from the CCWT by pumping the wastes into the tanker truck of a contracted offsite dangerous waste disposal vendor. This is the routine procedure for emptying the CCWT. Pumping the tank contents via the installed pumpout piping typically leaves a liquid heel. This heel will be pumped out via a portable pump and flexible tubing. The pickle process wastes are accepted by the disposal vendor based on an approved waste profile on file with the vendor.

3.2 *Decontamination of Debris Surfaces*

Waste solutions managed within the CCWT and its associated piping are acidic (low pH) aqueous solutions; deposits on the interior of piping and the waste tank are not anticipated. After pumping of the final batches of pickling solutions to the CCWT, the small process dip tank will be flushed with copious amounts of water. This water will be pumped to the CCWT via the installed transfer piping. (This has been the standard procedure after all batch pumpouts; transfer lines have no history of containing waste solutions for an appreciable amount of time.) The amounts of water utilized for the final system flushing will significantly exceed volumes typically utilized for routine batch pumpouts. Flushing of the transfer lines to a residue-free surface is anticipated. The rinsate from the final transfer line flushing will be part of the final CCWT inventory removed as described in 3.1, above.

Prior to the final CCWT pumpout, the annular space between the inner and outer tanks will be high pressure-washed with water (pressure washer or fire hose). Access will be gained through the removable cover on the north edge of the outer tank top as well as an additional similarlysized access hole that will be cut through the outer tank top near its south edge. If deemed necessary, additional access holes can be easily cut. Water from the initial rinse will be pumped into the CCWT via a portable pump and flexible tubing. Once this pumping is complete, the pump will be removed and the high pressure washing of the annular space (floor, outside of inner tank, inside of outer tank) will be repeated. This second batch of wash water will also be pumped to the CCWT. Based on the limited opportunity for the annular space to have received waste solutions, the consecutive high-pressure washes are anticipated to result in residue-free surfaces. The rinsate from the annular space washings will be part of the final CCWT inventory removed as described in 3.1, above.

Lastly, the interior surfaces of the CCWT itself will be decontaminated. This will occur immediately after the final inventory pumpout described in 3.1, above. As in the case of the between-tank annular space, the interior of the CCWT will be decontaminated via an initial high-pressure water wash; pumpout of the initial wash rinsate, in this case to the waste vendor tanker; and a second high-pressure water wash, followed by pumpout to the vendor tanker. Both pressure washings will utilize copious amounts of water and are anticipated to produce residue-free interior tank surfaces. Passage of the rinse water through the pumpout piping is also anticipated to effectively decontaminate that piping.

3.3 *Removal of Tanks and Associated Piping*

Following completion of the decontamination activities described in 3.2 above, all liquid transfer piping associated with the CCWT will be dismantled and removed. The exterior tank will be dismantled in-place by cutting it into readily handled sections (~3 ft. by 3 ft.) using a reciprocating power saw. Once the exterior tank has been effectively cut away, the interior tank will be similarly cut-up in place using a reciprocating power saw.

3.4 *Cleaning of the Concrete Support Pad*

Based on the double containment afforded by the tank-in-tank configuration of the CCWT, no release of waste solutions to the concrete support pad is reasonably expected. Some staining of the pad related to seepage of rain water and associated dust/dirt underneath the outer tank may be encountered. Pressure washing of the pad may be conducted for cosmetic reasons; containment/collection of the rinsate should not be necessary.

3.5 *Confirming Clean Closure*

When the decontamination activities described in Section 3.2 are complete, AREVA anticipates that the high pressure water sprays and water washing (40 CFR 268.45 Table 1, 1e and 2a, respectively) will have decontaminated the pertinent debris surfaces (piping interiors, tank walls/floors) to a clean debris surface as defined in the Alternative Treatment Standards for Hazardous Debris. Visual inspection, documented via field notes and photos as appropriate, will be used to confirm achievement of the performance standard.

As indicated in Section 1.2, Closure Performance Standard and General Closure Approach, for surfaces where the clean debris surface criterion cannot be demonstrated (e.g., excessive surface staining), sampling and analysis may be employed to demonstrate that the debris does not exhibit a dangerous waste characteristic, in this case, corrosivity, and therefore no longer requires management as a dangerous waste. AREVA's Sampling and Analysis Plan (SAP) that would be applied is described in Section 3.6 of this Closure Plan, and is included as Appendix A.

Lastly, potentially contaminated debris not amendable to decontamination or post-decontamination inspection/analysis (e.g. small bore piping, valves) will be conservatively designated and disposed of off-site in accordance with regulations.

3.6 *Sampling and Analysis and Constituents to be Analyzed*

A detailed SAP supporting this Closure Plan has been included as Appendix A. As previously discussed and based on the tank-within-a-tank construction of the CCWT unit and its placement on a thick, easily inspected concrete pad, contamination of environmental media (soil, groundwater) is not reasonably anticipated. Accordingly, utilization of the Appendix A SAP may only be required if the clean debris surface criterion as defined in 40 CFR 268.45 Table 1 cannot be demonstrated (e.g. excessive surface staining) for certain debris surfaces, or portions thereof. The SAP will include the following:

- Statement of objectives
- Assignment of organizational responsibility
- Project schedule
- Identification of chemical constituents/characteristics to be analyzed
- Procedures for sample collection and labeling
- Analytical methods
- Procedures for sample handling and chain-of-custody
- Procedures for decontamination of sampling equipment
- Quality assurance measures
- Provisions for reporting of data

Constituents/characteristics to be analyzed are based on a review of the wastes managed in the CCWT and are identified in the SAP. This review will be repeated at the future date at which AREVA notifies Ecology of its notification to begin closure. If deemed necessary based on this review, AREVA will submit a revised SAP and will not begin sampling and analysis until the revised SAP is reviewed and approved by Ecology.

3.7 *Role of the Independent Registered Professional Engineer*

An independent qualified registered professional engineer will become familiar with the closure activities for the CCWT by reviewing this plan, observing field activities, and reviewing records. Key activities to be observed and/or reviewed shall include but not be limited to:

- removal of wastes and waste residues,
- decontamination of debris surfaces,
- inspections to determine achievement of the clean debris surface performance standard,
- management of removed wastes and decontamination residuals,
- implementation of the SAP, if required, and
- results of laboratory analysis.

When closure is complete, the engineer will sign and stamp AREVA's certification of clean closure.

3.8 *Closure Certification*

Within 60 days of completion of closure activities on the CCWT, AREVA will, in accordance with WAC 173-303-610(6), submit to Ecology, by registered mail, certification that the unit has been closed in accordance with this closure plan. The certification will be signed by the appropriate company official and will also be signed and stamped by the independent qualified registered professional engineer who has monitored AREVA's implementation of the CCWT Closure Plan. AREVA will assemble, retain, and, as requested, submit to Ecology documentation supporting the certification. That information will include, but not be limited to:

- field notes and photographs documenting the closure activities,
- a description of any minor deviations from the plan and justification for these deviations,
- documentation of final disposition of dangerous wastes and treatment residuals,
- data resulting from implementation of the SAP, if required,
- a summary of activities and data observed/reviewed by the independent registered professional engineer, and
- a description of what the unit area looks like now that closure has been completed.

4.0 Closure Schedule and Timeframe

Notification of intent to close the CCWT will be sent to Ecology at least 45 days before initiating closure activities. Completion of closure activities will occur within 180 days. If the notification to Ecology includes a revised version of this closure plan or its accompanying SAP, the 180 day closure period will commence upon Ecology's approval of the revised plan and/or SAP. As provided in Section 3.8 above, closure certification will be submitted to Ecology within 60 days of completion of the closure activities.

5.0 Cost of Closure

5.1 *Closure Cost Estimate*

The information presented in this section for implementing the Closure Plan has been prepared in accordance with WAC 173-303-620(3). The following conservative assumptions were used in developing the cost estimate:

- A third party will be used to conduct closure activities.
- Inventory in the CCWT at the time of closure will be the total tank capacity, i.e. 2,000 gallons.
- Achievement of a clean debris surface will not be possible for some or all of the tank surfaces and thus the SAP (Appendix A) will need to be utilized to demonstrate that these tank surfaces do not exhibit the dangerous waste characteristic of corrosivity.
- Effective decontamination of interior pipe surfaces will not be able to be conclusively demonstrated, thus necessitating disposal of the piping as dangerous waste.
- Although eventual release of the tank structural materials from dangerous waste regulation is anticipated, the tanks will be dismantled in a manner that will not allow for their sale or re-use in another application. The tanks will be disposed of offsite as industrial waste.
- The closure activities will be overseen by an independent qualified registered professional engineer.

The costs for closure of the CCWT will consist primarily of the costs for disposal of the final tank inventory; labor costs for decontaminating debris surfaces (piping, tanks); labor costs for dismantling the tanks and associated piping; labor costs and analytical costs for enactment of the sampling and analysis plan; disposal costs for the tank materials and piping; and costs for procuring the services of the independent registered professional engineer. These costs are presented below in Table 1, CCWT Closure Labor Costs, and Table 2, CCWT Closure Non-Labor Costs. The Table 1 labor costs are in turn based on the worker unit costs provided in Table 3, Worker Unit Cost Schedule.

The total costs taken from Tables 1-3 are summarized below and reflect the total amount for which AREVA must provide financial assurance relative to closure of the CCWT.

Total Labor Costs (Table 1)	$5,607
Total Non-Labor Costs (Table 2)	$9,175
Subtotal	$14,782
Contingency (10%)	$1,478
TOTAL	$16,260

The closure cost estimate will be adjusted annually for inflation in accordance with WAC-303-620(3)(c).

5.2 *Financial Assurance for Closure*

Financial assurance for closure will be provided by a letter of credit and associated standby trust agreement. Letter of Credit No. SB 22.300 is currently on-file with the Washington Department of Ecology's Hazardous Waste and Toxics Reduction Program office. The amount of the letter of credit will be maintained so as to cover the estimated closure costs plus contingency for the CCWT as well as AREVA's other permitted treatment, storage, or disposal facility - its Dangerous Waste Storage Facility (DWSF) dedicated to storage of containerized dangerous wastes.

5.3 *Financial Assurance for Liability*

AREVA will provide financial assurance for third-party liability coverage for sudden accidental occurrences as called for in WAC 173-303-620(8)(a) via a letter of credit. Letter of Credit No. SB 22.301 is currently on-file for this purpose with Ecology's Hazardous Waste and Toxics Reduction Program office.

Table 1 CCWT Closure Labor Costs

Work Activity	Labor Required, Days	Labor Cost, $*
Decontamination (high pressure washing) of tank/piping surfaces	General Laborer, 2	670
Dismantling of tank piping, valves, etc.	Pipefitter, 1 Electrician, 0.5	620 264
Dismantling of inner and outer tanks	General Laborer, 2	670
Inspection/sampling of debris surfaces	Environmental Engineer, 0.5	508
Packing/manifesting of offsite shipments (tank materials, piping, valves)	General Laborer, 1 Environmental Engineer, 0.5	335 508
Preparation of regulatory submittals	Environmental Engineer, 2	2,032
Total Labor Costs		5,607

* Costs based on Worker Unit Cost Schedule provided as Table 3.

Table 2 CCWT Closure Non-Labor Costs

Cost Component	Unit Cost, $	Total Cost, $
Vendor charges for pickup/disposal of final tank inventory (process waste and decontamination solutions)	1.98/gal + truck, driver, and mileage fees	6,487
Laboratory analyses of 8 tank/piping debris samples for solid corrosivity	20/sple.	160
Offsite disposal of 15 ft^3 of piping, valves, etc. (solid corrosive dangerous waste)	24.50/ft^3	368
Offsite disposal of 1.28 tons of tank materials (industrial waste)	47/ton	60
Services of independent registered professional engineer		1,900
Miscellaneous equipment/supplies	-	200
Total Non-Labor Costs		9,175

Table 3 Worker Unit Cost Schedule

Labor Cost Component	General Laborer	Pipefitter	Electrician	Environmental (Senior Project) Engineer
Salary & Fringe ($/hr)	29.26	54.24	46.19	-
Overhead Rate (%)	30	30	30	-
Profit on Labor (%)	10	10	10	-
Total Costs per Hour, $	41.84	77.56	66.05	127
Total Cost per Work Day, $	335	620	528	1,016

Notes:

- Salary and fringe rates for laborers and crafts derived from February 2008 Davis-Bacon Building Wage Rates for State of Washington, Benton County (Wage Determination WA11, Building).
- Overhead rate (average fixed + general) derived from R.S. Means, Building Construction Cost Data, 64th Edition, 2006.
- Environmental Engineer rate derived from currently contracted (2008) environmental engineering firm.

APPENDIX A - Sampling and Analysis Plan for Closure of the Component Chemical Waste Tank (CCWT) at the AREVA NP Inc. Richland Fuel Fabrication Facility

1.0 Sampling Objective

The objective of this sampling and analysis plan (SAP) is to evaluate decontaminated debris from closure of the CCWT to demonstrate that the debris does not exhibit the dangerous waste characteristic of corrosivity, thereby no longer requiring management as a dangerous waste. As noted in the closure plan for the CCWT, debris surfaces will have been previously decontaminated via high pressure water sprays/flushing in order to achieve a clean debris surface as defined in 40 CFR 268.45 Table 1. Demonstration of a clean debris surface will allow release of the debris from dangerous waste management. Implementation of this SAP will be necessary only to the extent that there is debris for which a clean debris surface was not achieved (e.g., excessive staining) or cannot be verified via inspection (e.g., certain piping). Based on the anticipated achievement of clean debris surfaces, required implementation of this SAP is not anticipated.

2.0 Organizational Responsibility

The project manager for implementation of this SAP will be a qualified professional from the Environmental, Health, Safety, and Licensing (EHS&L) organization within AREVA. The project manager's responsibilities will include: ensuring the project is performed according to this SAP; selection/collection of samples; maintenance of field notes; acting as the laboratory interface; and producing a final report.

3.0 Project Schedule

The SAP will be implemented, if necessary, in conjunction with the closure of the CCWT. An overall schedule and timeline for closure of the CCWT is provided in Section 4.0 of the CCWT Closure Plan.

4.0 Constituents/Characteristics to be Analyzed

As discussed in Section 2.3 of the Closure Plan, the wastes managed in the CCWT designate solely due to their corrosivity (D002). Accordingly, this SAP is limited to the collection of solid debris samples for the evaluation of state-only solids corrosivity. This testing will be conducted in accordance with SW846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Method 9045.

5.0 Sample Collection and Labeling

Sample collection will involve the cutting of small pieces of material from the potentially contaminated surfaces of larger pieces of debris, e.g. approximately 3 ft. by 3 ft. sections of tank wall or no greater than 6 foot sections of piping. As previously discussed, implementation of this SAP will only occur if certain of the debris does not meet, or cannot be effectively inspected to demonstrate that it meets, the clean debris surface criterion of 40 CFR 268.45 Table 1. Sections of tank walls or piping meeting the clean debris surface criterion will not require sampling. Samples will be collected as follows:

Sample Type	No. Samples	Instructions
Tank material	5	From five individual sections of tank material exhibiting staining
Piping	3	From three individual sections of piping exhibiting staining or not able to be visually inspected

Samples of the tank material will be collected via a small hand saw or alternatively, using a sharpened wood chisel and mallet. Piping samples will be collected via a hand saw. Efforts will be made to preserve a surface area to mass ratio for the sample that is representative of the material being sampled. Sections of tank material or piping sampled will be labeled sequentially via an indelible marker; this number will also be recorded on the plastic sample bottle into which the sample is placed. An example of a sample label is provided as Figure 3.

In addition to the information recorded on the sample label, any other pertinent information needed to describe or characterize the sampled material or the sample itself will be recorded in the field notes.

6.0 Analytical Method

As noted in Section 4.0, above, the debris samples will be analyzed for solids corrosivity in accordance with Method 9045 of SW846. This method involves soaking the sample in a volume of water in milliliters equal to the weight of the sample in grams for one hour. The water is then measured for pH via a calibrated pH meter. The debris sample is determined to be non-corrosive if the pH of the water is greater than 2 but less than 12.5.

7.0 Decontamination of Sampling Equipment

All sampling equipment contacting the sampled debris surfaces will be decontaminated prior to use and between samples by washing with a laboratory-grade, non-phosphate detergent and rinsing with deionized water. All field personnel will wear clean nitrile or vinyl gloves when conducting sampling and decontamination procedures.

8.0 Sample Handling and Chain of Custody

Samples collected and labeled as outlined in Section 5.0 will be placed in a cooler with ice immediately after collection. The cooler of filled sample containers, along with sufficient ice to effectively cool the samples during transport, will be shipped via overnight courier to the contracted laboratory. The selected laboratory will be accredited under WAC 173-50.

All samples will remain in the custody of the sampling personnel during each sampling day. At the end of each sampling day and prior to the transfer of the samples for offsite shipment, chain-of-custody entries will be made for all samples using a Chain-of-Custody form (Figure 4). One Chain-of-Custody form will be completed for each cooler of samples. All information on the Chain-of-Custody form and the sample container labels will be checked against the sampling log entries, and the samples will be recounted before transferring custody. Upon transfer of custody, the Chain-of-Custody form will be signed by the project manager, sealed in plastic, and placed inside the sample cooler.

A signed, dated custody seal (Figure 5) will be placed over the lid opening of the sample cooler to indicate if the cooler is opened during shipment. All Chain-of-Custody forms received by the laboratory must be signed and dated by the laboratory's sample custodian.

The custodian at the laboratory will note the condition of each sample received as well as questions or observations concerning sample integrity. The sample custodian will also maintain a sample tracking record that will follow each sample through all stages of laboratory processing. These records will be used to determine compliance with holding time limits during laboratory audits and data validation.

9.0 Quality Assurance Measures

The collection of solid debris samples and their follow-on analysis for corrosivity are not amenable to many of the traditional sampling and analysis quality assurance measures, i.e. blind duplicates; trip blanks; equipment rinsates; and laboratory spikes, and percent recoveries. The laboratory utilized will be accredited under WAC 173-50. For the sake of data quality assurance, AREVA will request copies of the laboratory's calibration data associated with the pH measurements.

10.0 Data Reporting

The results of the SAP will be reported to Ecology as part of the closure certification package.

Figure 1 Site Map

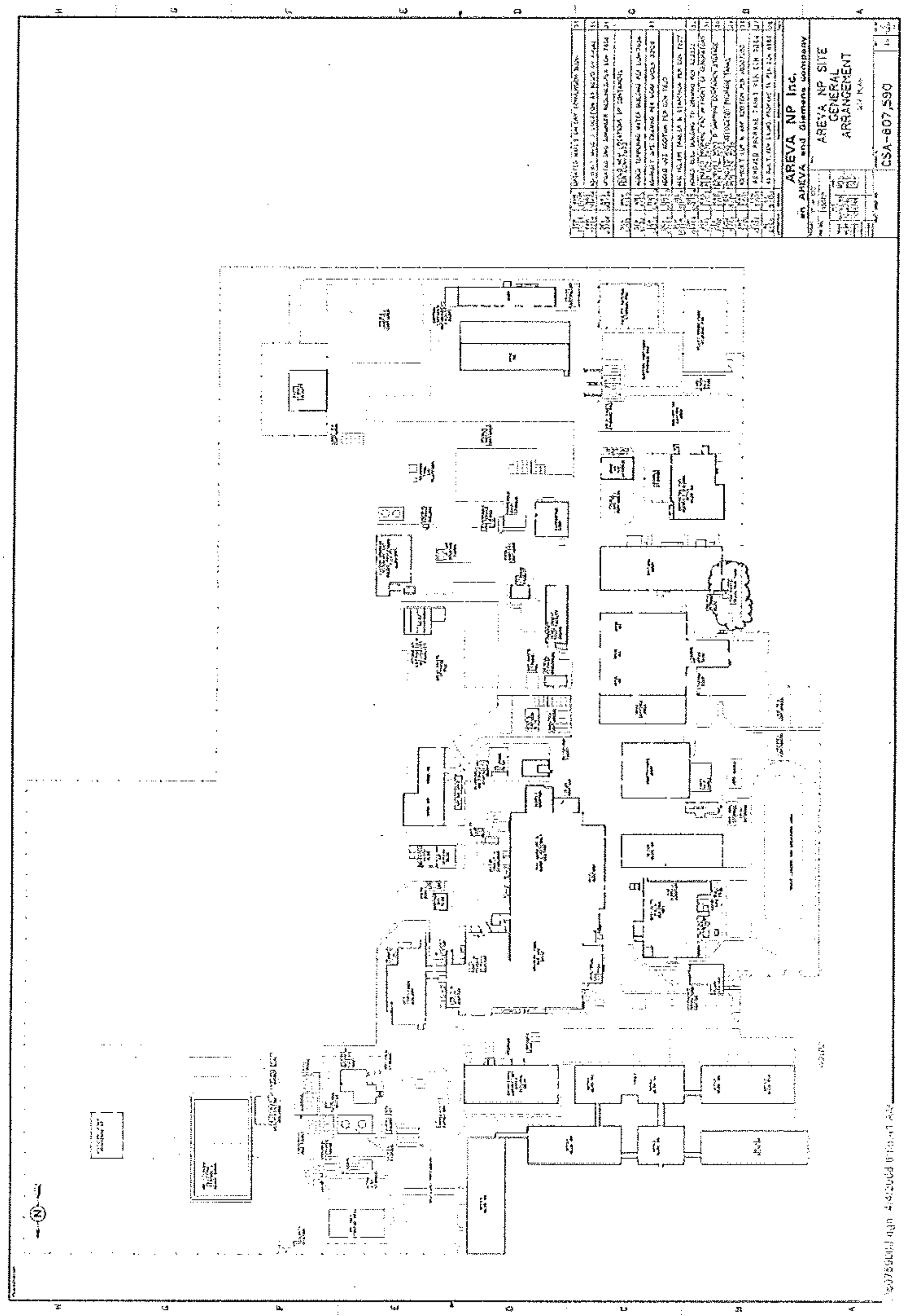


Figure 2 Photo of CCWT

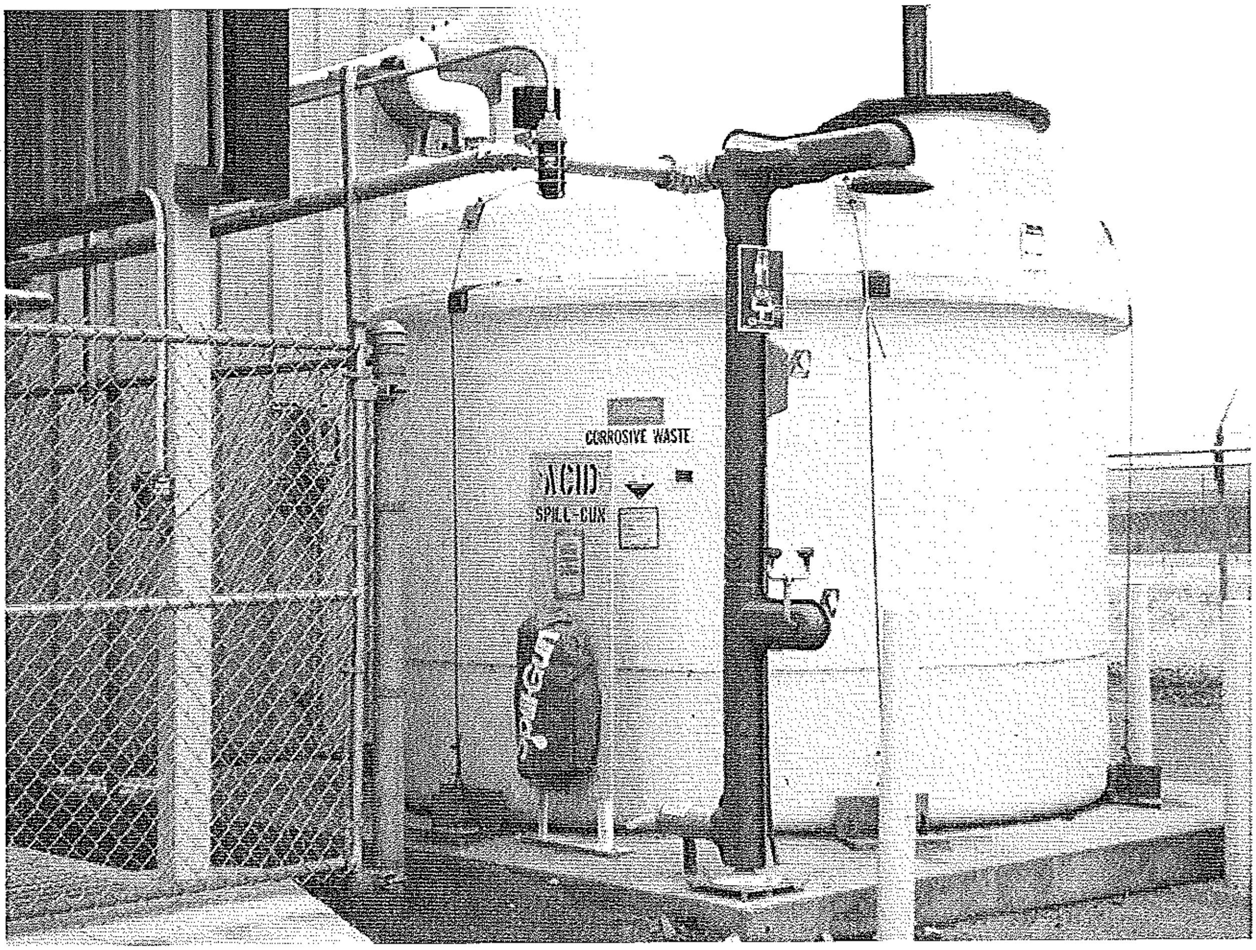


Figure 3 Sample Label

Client: ______________________________

Date Sampled:________ **Time:** _________

Source: ____________________________

Analysis: ___________________________

Unpreserved, Preserved_______________

Figure 4 Chain of Custody Form

AREVA

AREVA NP INC.

2101 Horn Rapids Road
Richland, WA 99354

Customer contact:	Project ID	Order ID:	Requested Tests
Business name:			
Address:			
Phone:	FAX:		

Regulatory Authority: NPDES: ☐ Drinking water: ☐ Solid waste: ☐ Other: ☐

Lab Use Only	Customer Sample ID (Unique identifier or code)	Collection Date	Collection Time	Matrix	Number of bottles											Comments

Signature	Date/Time	Signature	Sample Conditions at receipt:
Collected/ Relinquished by:		Received by:	Temperature (circle): *Ambient* *Cold* *Frozen*
Relinquished by:		Received by:	Containers intact/Lids tight: ☐ VOC vials without headspace: ☐ Labels match custody: ☐
Relinquished by:		Signature	Date/Time
Laboratory receipt:		Pre-log storage:	

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Figure 5 Chain of Custody Seal

AREVA

AREVA NP INC.
2101 Horn Rapids Road
Richland, WA 99354

TO:

Authorized Signature

AREVA NP Inc.

E06 Environmental Protection
E06-04 Miscellaneous Reports

E06-04-009
Version 2.0

Closure Plan for the Component Chemical Waste Tank

Date (GMT)	Signed by
08/31/2009 18:21:44	Maas, Loren
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08/31/2009 18:32:58	Watkins, Terra
Authorization/Title	Document Control Approval